

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-211237

(43)Date of publication of application : 02.08.2000

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(51)Int.Cl.

B41M 5/00

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(21)Application number : 11-014560

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(22)Date of filing : 22.01.1999

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## (54) INK JET IMAGE RECORDING MEDIUM

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide an image recording medium capable of being employed preferably in an ink jet method, having a photographic quality and the same handling property as a silver salt photograph; moreover, having the same image fastness as the silver salt photograph.

SOLUTION: The image recording medium has one or more layers containing at least a polymer having an alkylene oxide chain as an ink fixing layer (a), and one or more layers containing polyvinyl alcohol (b) as well as the aforementioned layer (a). Also, an ink jet recording method employing the image recording medium is obtained as well.

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## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to an ink-jet image recording medium, especially the ink-jet image recording medium by which quality of image and picture shelf life were improved.

[0002] As an image recording medium used for an ink-jet method, the paper called ordinary paper and an ink-jet record form was used conventionally. As for the common ink-jet record form, the ink absorbing layer is prepared on paper (base material). However, by the conventional image recording medium, it is the situation that the performance of a printer cannot fully be demonstrated, by remarkable improvement of the printer of the latest ink-jet method. There is bleeding of ink in the conventional image recording medium, and it cannot respond to the high resolution of the printer of the latest ink-jet method. Moreover, although a picture came to be asked for glossiness like a photograph with the improvement of quality of image, the conventional image recording medium has low glossiness. Therefore, improvement is needed for the grade corresponding to improvement of an ink-jet method also for the image recording medium.

[0003] While use of an ink-jet picture spread, the request which wants to create the picture of photograph quality of image in an ink jet came out. On the other hand, a picture with the gloss near [ form / ink-jet record / conventional ] a photograph came to be acquired by preparing a lamination layer on a base material. However, conversely, the glossiness had slow dryness of ink and was what it is hard to use. Using polyalkylene oxide and those derivatives as good television layer polymer of a drying property is proposed by JP,3-42590,B, the No. 15743 [ four to ] official report, etc. However, these were what a front face tends to paste up on other papers etc.

[0004]

[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the image recording medium which can be preferably used for an ink-jet method. Other purposes of this invention are to offer an image recording medium with the same handling nature as photograph quality of image and a silver salt photograph. this invention -- being the further -- others -- the purpose is to offer an image recording medium with the same picture robustness as photograph quality of image and a silver salt photograph

[0005]

[Means for Solving the Problem] According to this invention, the image formation method of following the (1) - (the ink-jet image recording medium of 9) and following (10) is offered, and the above-mentioned purpose of this invention is attained.

(1) The ink-jet image recording medium characterized by preparing one or more layers which contain polyvinyl alcohol apart from one or more layers containing at least one sort of polymer which has at least one sort of alkylene oxide chains, and the (a) (b) above-mentioned (a) layer as the ink fixed bed on a base material.

(2) Ink-jet image recording medium given in the above (1) characterized by preparing the (a) layer in the base material side from the (b) layer.

(3) The above (1) characterized by the polymer which has the alkylene oxide chain of the (a) layer being the polymer which the hydroxyl group of a polyethylene-oxide end and the compound in which a reaction is possible are made to react to a polyethylene oxide, and is obtained, or ink-jet image recording medium given in (2).

(4) Ink-jet image recording medium given in the above (1) or the above (2) characterized by the polymer which has the alkylene oxide chain of the (a) layer being the polymer which the compound in which a reaction is possible is made to react to a polyethylene oxide and a polysiloxane to both the end hydroxyl group of a polyethylene oxide, and the end functional group of a polysiloxane, and is obtained.

(5) An ink-jet image recording medium given in (3) to which a polyethylene-oxide end hydroxyl group and the compound in which a reaction is possible are characterized by being a diisocyanate compound or tri-isocyanate

compound.

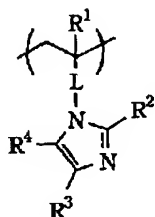
(6) An ink-jet image recording medium given in the above (4) which a polysiloxane end functional group is a hydroxyl group, and is characterized by the compound in which a reaction is possible being a diisocyanate compound or tri-isocyanate compound to both a polyethylene-oxide end hydroxyl group and a polysiloxane end functional group.

(7) An ink-jet image recording medium given in either of above-mentioned (1) - (6) characterized by the ink fixed bed containing the polymer mordant which has the repeat unit expressed with the following general formula (1).

[0006]

[Formula 4]

一般式(1)



[0007] (R1, R2, R3, and R4 being the same or the bivalent connection [ in which it differs and a hydrogen atom or the alkyl group of carbon numbers 1-6 is shown ] machine which L becomes from the combination of single bond or an alkylene machine, an arylene machine, -CO-, -O-, -NH-, or these bases is shown among a general formula (1).)

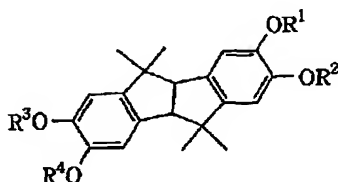
(8) a base material -- plastic film -- it is -- or -- or -- a polyolefine -- and -- an aryl group -- substitution -- a vinyl -- a monomer -- a polymer -- from -- becoming -- a group -- from -- choosing -- having -- at least -- one -- a sort -- polymer -- a binder -- \*\* -- carrying out -- a layer -- a front face -- a top -- laminating -- having -- \*\*\*\* -- paper -- it is -- things -- the feature -- \*\* -- carrying out -- the above -- (-- one --) --

(9) An ink-jet image recording medium given in either of above-mentioned (1) - (8) characterized by one of layers containing the compound expressed with the compound or the following general formula (3) expressed with the following general formula (2).

[0008]

[Formula 5]

一般式(2)

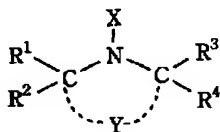


[0009] (the inside of a general formula (2), and R1-R4 are the same -- or it differs and an alkyl group is shown)

[0010]

[Formula 6]

一般式(3)



[0011] (Y shows a nonmetallic atom group required to form 5 - 7 member ring with a carbon atom and a nitrogen atom among a general formula (3).) X shows an alkyl group, an alkenyl machine, an alkynyl group, an aryl group, an acyl group, a sulfonyl machine, a sulfinyl machine, an oxy-radical machine, an alkoxy group, an aryloxy group, an acyloxy machine, or a hydroxyl group. R1-R4 are the same -- or it differs and a hydrogen atom or an alkyl group is shown Here, R1-R4 and any two bases in Y may join together, and 5 - 7 member ring may be formed.

(10) The above (1) The ink-jet record method using an ink-jet image recording medium given in either of - (9).

[0012] Although the polyethylene oxide pasted up since holding power is high although this invention persons of ink absorptivity are high, and ink rate of absorption were quick, maintenance ability used together the polyvinyl

alcohol (PVA) which is not necessarily high, and carried out method examination which loses both fault. However, an adhesive property and a result from which a re-imprint takes place simultaneously were rather brought only by using together simply. this result -- a part of polyethylene oxide -- ornamentation, molecular weight (polymerization degree), the copolymer kind of PVA and an amount, the degree of saponification, and molecular weight (polymerization degree) -- it turns out that it is not further based on both mixing ratio, a degree of cross linking, etc. However, it found out that this problem was solved by preparing independently the polymer layer which has an alkylene oxide chain, and a PVA layer by in having examined many things. That is, while one or more layers which used for the principal component at least one sort of polymer which has an alkylene oxide chain on the paper base material laminated by the polyolefine or a plastic film base material, and it were photograph quality of image by preparing one or more layers which make a principal component PVA prepared independently, the adhesive property was low, and the re-imprint was also able to obtain what is excellent in few physical picture shelf life. Furthermore, the bird clapper was clarified not only for optical picture robustness but for dark picture shelf life good by making it this composition.

[0013]

[Embodiments of the Invention] Hereafter, this invention is explained in full detail. Apart from one or more layers containing at least one sort of polymer in which the ink-jet image recording medium of this invention has (a) alkylene oxide chain as the ink fixed bed on a base material, and the (b) above-mentioned (a) layer, one or more layers containing polyvinyl alcohol are prepared. Hereafter, a base material, an ink absorbing layer, the layer prepared by request, a layer structure, etc. are explained.

[0014] The paper (lamination paper) in which the layer used as a binder laminates at least one sort of polymer chosen from the group which plastic film is used or consists of a polymer of a polyolefine and an aryl group substitution vinyl monomer as a [base material] base material on the front face is used. As the above-mentioned plastic film base material, it is \*\*\*\*\* which the film which consists of material, such as a polyester system resin, a diacetate system resin, a thoria TESETO system resin, an acrylic resin, a polycarbonate system resin, a polyvinyl chloride system resin, and a polyimide system resin, mentions preferably. Also in it, especially a polyethylene-terephthalate (PET) film is desirable.

[0015] It is desirable that it is 5-300 micrometers, and when it is lamination paper, as for the thickness of a base material, it is still more desirable that it is 80-200 micrometers. In the case of a plastic film base material, it is still more desirable that it is 10-200 micrometers. An under coat and other layers can be prepared in lamination paper if needed in addition to a lamination layer.

[0016] The lamination layer prepared on the front face of [lamination layer] paper is a layer which uses as a binder at least one sort of polymer chosen from the group which consists of a polymer of a polyolefine and an aryl group substitution vinyl monomer. The above-mentioned polymer which constitutes a binder occupies more than 60 mass % more than 55 mass % especially more preferably more than 50 mass % of this lamination layer preferably. The thing of crystallinity [ polyolefine ] is used preferably. As an example, a polyethylene resin, polypropylene resin, a poly1 butene resin, a poly4 methyl 1 pentene resin, etc. can be mentioned. It can use, if it is crystallinity even if it is a copolymer. As an example of the polymer of an aryl group substitution vinyl monomer, polystyrene resin and the poly (alpha methyl styrene) resin can be mentioned. Also in these polymer, especially a polyethylene resin is desirable. a lamination layer -- an application -- or it can prepare on a base material by the melting extrusion method

[0017] As for a lamination layer, it is desirable to contain white pigments, a tint attachment color, or a pigment. Titanium oxide and the zinc oxide of white pigments are desirable, and especially its anatase type titanium oxide is desirable. In order to improve the dispersibility of anatase type titanium oxide, you may use a zinc oxide together. When using together, as for the rate of a zinc oxide, it is desirable that it is below 50 mass % of the total quantity of titanium oxide and a zinc oxide. It is desirable that it is five to 50 mass %, as for the amount of the white pigments in a lamination layer, it is still more desirable that it is ten to 50 mass %, and it is most desirable that it is 15 to 30 mass %.

[0018] A tint attachment color or a pigment colors a lamination layer, and it is used in order to adjust the surface reflection factor. When based on the applying method, as for these colors or a pigment, in 300 degrees C or more, it is [ in / the formation temperature of a lamination layer ] desirable to have thermal resistance. As a desirable color or a pigment, cobalt blue, ultramarine blue, a neodymium oxide, etc. are mentioned concretely. As for a color or a pigment, it is desirable to use it in the range of 0.1 - 3 mass % of white pigments. The kind of a tint attachment color or pigment can be chosen, and the surface reflection property of a base material can be adjusted by adjusting the amount used.

[0019] 10-100 micrometers of 15-50 micrometers of lamination layer thickness are 20-35 micrometers still more preferably more preferably. Moreover, as for the front face of a lamination layer, it is desirable to finish in the shape of a mirror plane. After giving surface activity-ized processing, for example, corona discharge processing, and a flame treatment to the front face of a lamination layer, you may prepare each class mentioned later in it.

[0020] An under coat can be prepared between the lamination layer of a [under coat] base material, and the ink fixed bed. An under coat is a layer which uses gelatin as a binder preferably. Gelatin is depended and is contained more than 60 mass % still more preferably more than 55 mass % preferably more than 50 mass % of an under coat. It is desirable that a fluorescent brightener is included in an under coat in addition to gelatin. 0.5-5 micrometers of under coat gelatin layer thickness are 0.7-3 micrometers more preferably.

[0021] In the case of a [layer prepared in other arbitration] paper base material, it is desirable to prepare a lamination layer also in the background of a base material as a back layer. About the detail of a back lamination layer, it is the same as that of the above-mentioned lamination layer. As for a back lamination layer, it is desirable to have the function to adjust the rate of swelling and curl balance of a base material. Moreover, as for a back lamination layer, it is desirable to have an antistatic function. As for the surface resistivity of a back lamination layer, specifically, it is desirable that it is below 1T (Thera) omega-cm.

[0022] The above-mentioned (a) layer which constitutes the ink fixed bed of the ink-jet image recording medium of a [polymer which has alkylene oxide chain] this invention contains the polymer (only henceforth "alkylene oxide polymer") which has an alkylene oxide chain. Although the above-mentioned alkylene oxide polymer may be what thing as long as it is the polymer which has an alkylene oxide chain in a polymer molecule, it can mention the polymer of following classification (A) - (E) preferably.

(A) Polyethylene oxide.

(B) Polymer which a polyethylene oxide, a polyethylene-oxide end hydroxyl group, and the compound Y in which a reaction is possible are made to react, and is obtained.

(C) The homopolymer or copolymer of the vinyl monomer which has an alkylene oxide chain in a side chain.

(D) Polymer which the hydroxyl group of the compound B which Compound X and the following oxide compound A which have 2-4 active hydrogen machines are made to react, and is obtained, and Compound B, and the compound Y in which a reaction is possible are made to react, and is obtained.

(E) Polymer which the compound Z in which a reaction is possible is made to react to the polysiloxane which has a polyethylene oxide and an end functional group to both the end hydroxyl group of a polyethylene oxide, and the end functional group of a polysiloxane, and is obtained.

The polymer of a classification (B), (C), (D), and (E) is denaturation alkylene oxide polymer among the above. The above alkylene oxide polymer is independent one sort, or can be used combining two or more sorts. When using it combining two or more sorts, two or more sorts in each classification may be used together, and two or more sorts of alkylene oxide polymer may be used together ranging over two or more classifications.

[0023] As a compound Y for obtaining the polymer of a classification (B), a multiple-valued carboxylic acid, a multiple-valued carboxylate, a multiple-valued carboxylic-acid halogenide, the acid anhydride of a multiple-valued carboxylic acid, the low-grade alkyl ester of a multiple-valued carboxylic acid, a diisocyanate compound, tri-isocyanate compound, a dihalogen-ized aliphatic compound, and the poly epoxy compound are mentioned. As a multiple-valued carboxylic acid, a phthalic acid, a maleic acid, terephthalic acid, a citric acid, an adipic acid, sebacic acid, a succinic acid, trimellitic acid, etc. are mentioned. Moreover, as an acid anhydride, phthalic anhydride, maleic-anhydride, succinic-anhydride, itaconic-acid-anhydride, trimellitic anhydride and anhydrous 1, and 8-naphthalic acids, those salts, etc. are mentioned. As a multiple-valued carboxylic-acid halogenide, phthaloyl chloride, tele phthaloyl chloride, iso phthaloyl chloride, horse mackerel POIRU dichloride, etc. are mentioned. As low-grade alkyl ester of a multiple-valued carboxylic acid, the dimethyl ester of the above-mentioned multiple-valued carboxylic acid, monomethyl ester, diethyl ester, dibutyl ester, etc. are mentioned. As a diisocyanate compound, a diphenylmethane diisocyanate, hexamethylene di-isocyanate, xylenediisocyanate and 4, and 4'-methylene screw (cyclohexyl isocyanate) etc. is mentioned. As a dihalogen-ized aliphatic compound, 1, 4-dichlorobutane, 1, 6-dichloro hexane, 1, 6-dibromo hexane and 1, and 8-dibromo octane etc. is mentioned. Moreover, as a poly epoxy compound, 1, 2; 3, 4-diepoxy butane, 1, 2; 7, and 8-diepoxy octane, for example, diglycidyl hexahydro phthalate etc., are mentioned, for example.

[0024] A polyethylene oxide and Compound Y may use one sort, respectively, and may use two or more sorts. The polymer of a classification (B) makes a polyethylene oxide, a polyethylene-oxide end hydroxyl group, and the compound Y in which a reaction is possible react. Although it is desirable to prepare beforehand and to use, a polyethylene oxide and Compound Y are made to contain in application liquid. It is made to react to process (at

the time [ At the time of an application ] of application liquid dryness (drying temperature of 25 degrees C - 90 degrees C) inside of an after [ an application ] passage-of-time period, and the application afterbaking (25 degrees C - 90 degrees C) passage of time) in which an image recording medium is manufactured, and does not matter as polymer of a classification (B) by the time of use. In this case, you may add in the same application liquid, and a polyethylene oxide and Compound Y may be added and used into another application liquid.

[0025] When obtaining the polymer of a classification (B), the desirable compound Y is a diisocyanate compound or tri-isocyanate compound. The following compound is mentioned as an example of a diisocyanate compound or tri-isocyanate compound.

[0026] Tolyene diisocyanate, a diphenylmethane -4, 4'-diisocyanate, Xylylene diisocyanate, naphthalene -1, 5-diisocyanate, p-phenylene diisocyanate, dibenzyl diisocyanate, diphenyl ether diisocyanate, The aromatic G or the tri-isocyanate monomers like m-, p-tetramethyl xylylene diisocyanate, or triphenylmethane triisocyanate; Hydrogenation tolylene diisocyanate, The hydrogenation diphenylmethane -4, 4'-diisocyanate, 1, 4-tetramethylene di-isocyanate, The aliphatic series like 1, 6-hexamethylene di-isocyanate, hydrogenation xylylene diisocyanate, cyclohexyl -1, 4-diisocyanate, or isophorone diisocyanate or cycloaliphatic diisocyanate monomers are mentioned. These isocyanate compounds are independent one sort, or can be used combining two or more sorts. Moreover, various kinds of isocyanate prepolymers like the polyisocyanurate type diisocyanate of two organic functions guided from these various diisocyanate monomers, adduct type diisocyanate, or buret type diisocyanate can be used as a compound Y.

[0027] The homopolymer of the vinyl monomer which the polymer of a classification (C) is desirable and has an alkylene oxide chain, or a copolymer with one or more kinds of other vinyl monomers is mentioned. As a vinyl monomer which has an alkylene oxide chain, as long as it is guided from an ethylene nature unsaturation monomer, any are sufficient. As a desirable ethylene nature unsaturation monomer, acrylic esters, methacrylic esters, acrylamides, methacrylamide, olefins, vinyl ether, unsaturated fatty acid (an example, an acrylic acid, a methacrylic acid, itaconic acid, etc.), and vinyl esters (an example, a propionic-acid vinyl, pivalic-acid vinyl, etc.) are mentioned.

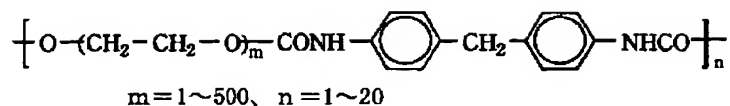
[0028] As a compound X which has 2-4 active hydrogen machines for obtaining the polymer of a classification (D), ethylene glycol, a diethylene glycol, a triethylene glycol, a propylene glycol, 1, 4 butanediol, 1, 2-cyclohexane diol, 1 and 2, 4-butane triol, neopentyl glycol, a glycerol, a trimethylol propane, a pentaerythritol, a triethanolamine, bisphenol A, etc. are mentioned, for example. Moreover, as for an ethyleneoxide and a carbon atomic number, the alkylene oxide of 3-8 is mentioned as an oxide compound A for obtaining the polymer of a classification (D). As desirable alkylene oxide, propylene oxide, butylene oxide, styrene oxide, etc. are mentioned. Furthermore, the same thing as what was mentioned with the compound Y for obtaining the polymer of a classification (B) as a compound Y for obtaining the polymer of a classification (D) is mentioned. These compounds A, X, and Y are independent one sort respectively, or can be used combining two or more sorts.

[0029] The example of the polymer classified above (B) is shown below.

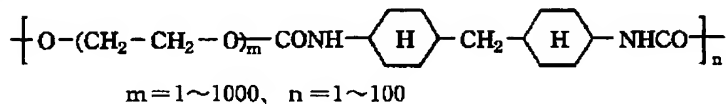
[0030]

[Formula 7]

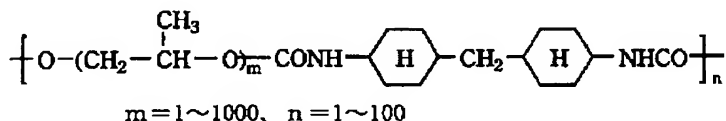
B-1



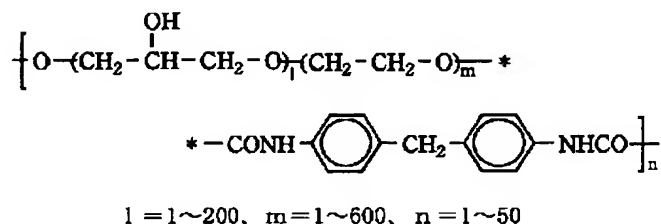
B-2



B-3



B-4



[0031] These compounds are compoundable by the method of a publication to JP,10-16378,A.

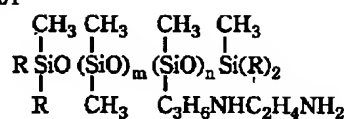
[0032] Moreover, as a polysiloxane which has an end functional group for obtaining the polyalkylene oxide polymer of a classification (E), (i) amino denaturation polysiloxane, (ii) epoxy denaturation polysiloxane, an alcoholic (iii) denaturation polysiloxane, (iv) mercapto denaturation polysiloxane, (v) carboxyl denaturation polysiloxane, etc. are mentioned. (ii) About an epoxy denaturation polysiloxane, it is also possible by making it react with a polyol, a polyamide, and a polycarboxylic acid to consider as the polysiloxane which has an end hydroxyl group. These concrete examples of a compound are given below.

[0033]

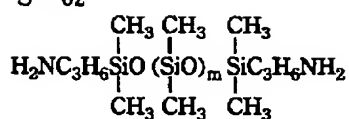
[Formula 8]



S-01

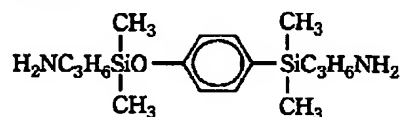
(m=1~10, n=2~10, R=CH<sub>3</sub> 又は OCH<sub>3</sub>)

S-02

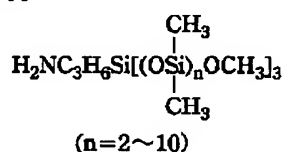


(m=0~200)

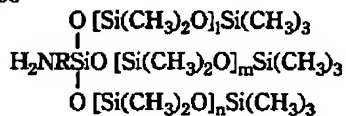
S-03



S-04

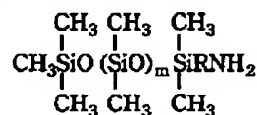


S-05



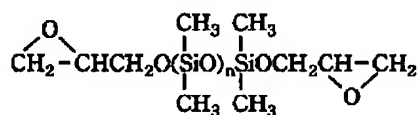
(分岐点=2~3, R=低級アルキル基、l=2~200、m=2~200、n=2~200)

S-06



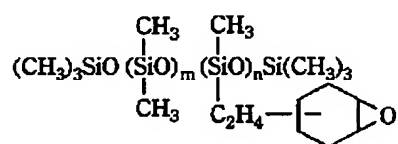
(m=1~200, R=低級アルキル基)

S-07



(n=1~200)

S-08

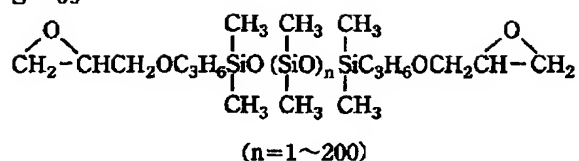


(m=1~10, n=2~10)

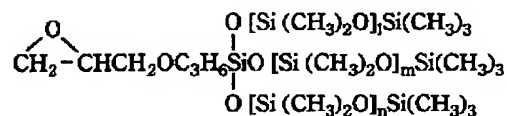
[0034]

[Formula 9]

S-09

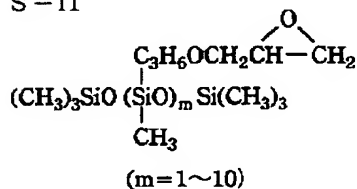


S-10

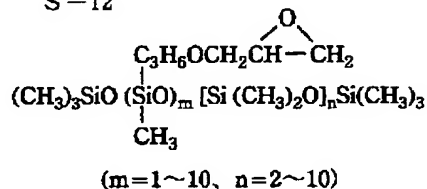


(分岐点=2~3、R=低級アルキル基、l=2~200、m=2~200、  
n=2~200)

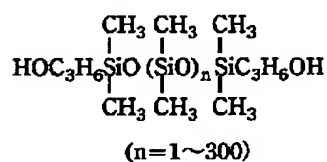
S-11



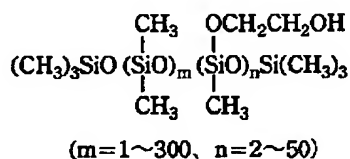
S-12



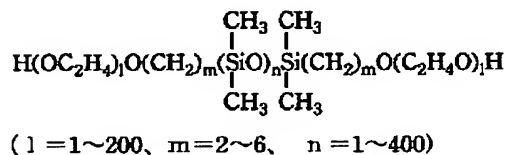
S-13



S-14



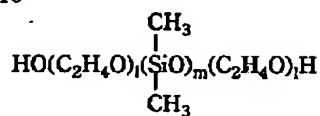
S-15



[0035]

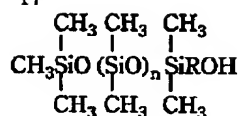
[Formula 10]

S-16



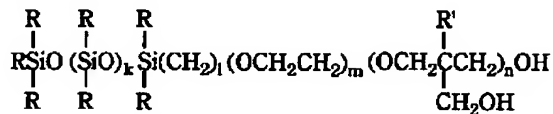
(l=1~200, m=1~200)

S-17

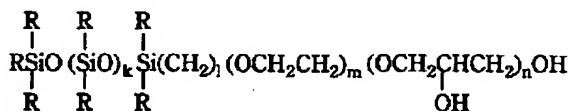


(n=1~400, R=低級アルキル基)

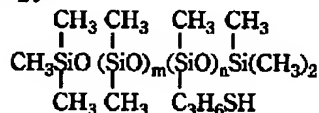
S-18

(R=CH<sub>3</sub>又はOCH<sub>3</sub>、R'=水素原子又はアルキル基、k=1~250、l=0~5、m=0~50、n=1~3)

S-19

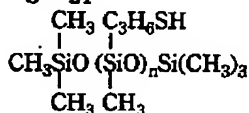
(R=CH<sub>3</sub>又はOCH<sub>3</sub>、R'=水素原子又はアルキル基、k=1~250、l=0~5、m=0~50、n=1~3)

S-20



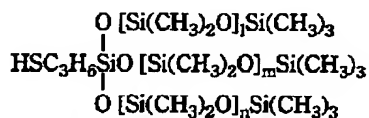
(m=1~20, n=2~100)

S-21



(n=2~100)

S-22

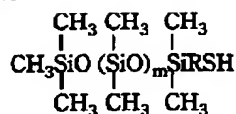


(分岐点=2~3、R=低級アルキル基、l=2~200、m=2~200、n=2~200)

[0036]

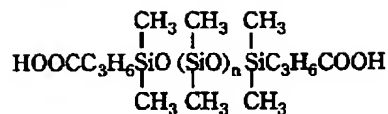
[Formula 11]

S - 23



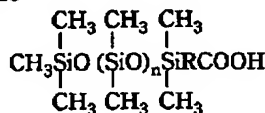
(m=1~300、R=低級アルキル基)

S - 24



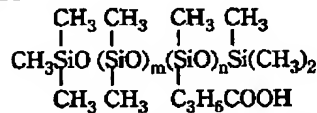
(n=1~200)

S - 25



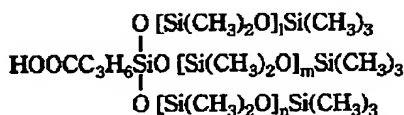
(n=1~200、R=低級アルキル基)

S - 26



(m=1~200、n=2~50)

S - 27



(分岐点=2~3、R=低級アルキル基、l=2~200、m=2~200、n=2~200)

[0037] These denaturation polysiloxanes are compoundable by the method of a publication to JP,7-157725,A.

[0038] The same thing as what was mentioned with the compound Y for obtaining the polymer of a classification (B) as a compound Z in which a reaction is possible to both the end hydroxyl group of a polyethylene oxide and the end functional group of the above-mentioned denaturation polysiloxane is mentioned.

[0039] As for the average molecular weight of the above-mentioned alkylene oxide polymer, in this invention, it is desirable that it is 20,000-500,000. When average molecular weight is less than 20,000, ink absorptivity is small, and by the passage of time, it becomes easy to move this polymer itself in a coat, and a blot with the passage of time tends to change still more greatly. Since the viscosity of the application liquid containing this polymer thickens remarkably and an application becomes difficult, when average molecular weight exceeds 500,000, in order that the upper limit of an addition may receive restrictions greatly in practice and may obtain sufficient ink absorptivity, it becomes impossible to use a complement. The ranges of more desirable average molecular weight are 50,000-400,000.

[0040] the above-mentioned (a) layer -- setting -- the amount of the above-mentioned alkylene oxide polymer used -- desirable -- 1 - 40 g/m<sup>2</sup> -- more -- desirable -- 5 - 30 g/m<sup>2</sup> -- it is 10 - 25 g/m<sup>2</sup> most preferably When a picture is not formed and 40 g/m<sup>2</sup> is exceeded, it stops being equal to printing in less than two 1 g/m.

[0041] The ink fixed bed of the ink-jet image recording medium of a [polyvinyl alcohol] this invention also consists of (b) layers containing polyvinyl alcohol apart from the above-mentioned (a) layer. here -- polyvinyl alcohol (PVA) -- a vinyl alcohol unit -- more than 50 mol % -- it contains That is, it is more than 50 mol %, as for the degree of saponification of PVA (vinyl alcohol unit comparatively), it is desirable that it is [ 60-90 mol ] %, and it is still more desirable that it is [ 65-80 mol ] %. Although the degree of saponification of the polyvinyl alcohol generally used for the recording paper for ink jets is a value exceeding 90-mol %, the direction which uses the polyvinyl alcohol not more than 90 mol % has [ the granular nonuniformity of the ink in a picture ] the degree of saponification desirable [ the degree ] few. PVA can include the repeat unit guided from an ethylene nature unsaturation monomer in addition to a vinyl alcohol unit. As an example of an ethylene nature unsaturation monomer, an acrylic ester, a methacrylic ester, an acrylamide, methacrylamide, an olefin, vinyl ether, unsaturated fatty acid (an example, an acrylic acid, a methacrylic acid, itaconic acid), and a vinyl ester (an example, vinyl acetate, a propionic-acid vinyl, pivalic-acid vinyl) are contained. The alkyl thio machine or the aryl thio machine may combine with the end of PVA system polymer. As for the carbon atomic number of the alkyl thio machine of an end, and an aryl thio machine, it is desirable that it is eight or more.

[0042] As for PVA, it is desirable that it is especially usual polyvinyl alcohol which consists only of a vinyl alcohol unit and a vinyl acetate unit. It is desirable that it is 300 or more, as for the polymerization degree of PVA used for the (b) layer of the ink fixed bed, it is still more desirable that it is 500-5000, and it is most desirable that it is 500-2000. If membraneous quality is weak in it being less than 300 and 5000 is exceeded, the fall of ink rate of absorption will be seen. In this invention, the amount of PVA used used for the ink fixed bed is 1 - 10 g/m<sup>2</sup>. It

is 2 - 5 g/m<sup>2</sup> more preferably.

[0043] The ink-jet image recording medium of [lamination of image recording medium] this invention consists of a layer (ink fixed bed) which can fix two or more ink on the paper base material which the layer which uses as a binder at least one sort of polymer chosen from the group which consists of a polymer of a plastic film base material or a polyolefine, and an aryl group substitution vinyl monomer preferably on a base material laminates on the front face, as already stated. one -- (a) -- it is the layer which makes a principal component at least one sort of alkylene oxide polymer, and another is a layer which makes (b) PVA a principal component Here, a principal component is a component which exists most mostly among the components which constitute the layer, and is a component which occupies more than 50 mass % preferably. It is more desirable from a viewpoint of picture shelf life to prepare the above-mentioned (a) layer in the support pair side from the above-mentioned (b) layer.

[0044] As for the sum total of the thickness of the ink fixed bed prepared on a base material, it is desirable that it is 2-60 micrometers, and it is still more desirable that it is 4-35 micrometers. As for the layer prepared on a base material, it is desirable that the rate of swelling in ink is 100 - 300% as a whole, and it is still more desirable that it is 150 - 250%. The rate of swelling is the value (%) which broke by dryness thickness the value (swelling value) which lengthened dryness thickness from the application layer thickness measured after flooding with the ink which sets an ink-jet image recording medium as the 25-degree C object for 1 minute. Adjustment of the rate of swelling is important in order to control the penetration and the breadth of ink, or in order to prevent the blemish within a printer.

[0045] Even if it forms the ink fixed bed prepared on a base material by simultaneous application, you may form it by application many times. two sorts of ink fixed beds of this invention -- (a) -- the method of painting one or more layers containing at least one sort of alkylene oxide polymer using the application liquid which uses the organic solvent as the main solvent, and painting one or more layers using (b) polyvinyl alcohol using the application liquid which uses water as the main solvent is desirable In this case, although all layers may be formed by simultaneous application, it is desirable to apply independently the layer using the application liquid which uses as the main solvent an application and water of the layer using the application liquid which uses the organic solvent as the main solvent.

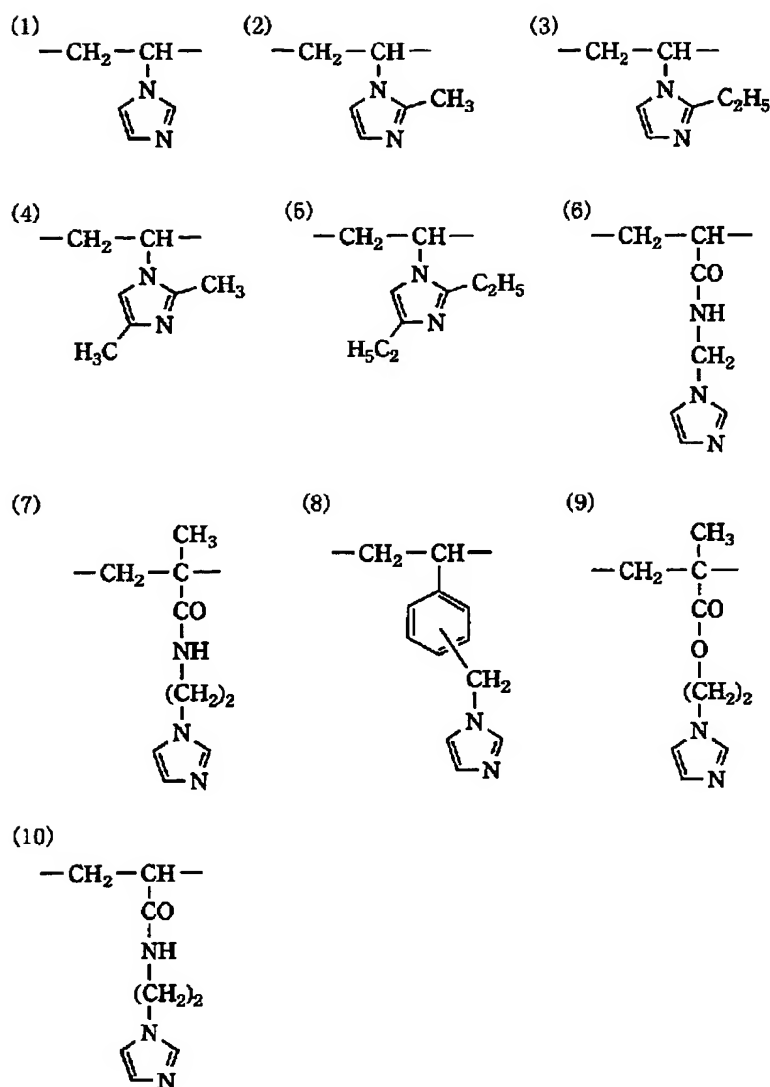
[0046] You may blend with the ink fixed bed the compound which can be used into the following surface-protection layer if needed. Furthermore, it is desirable to blend with the ink fixed bed the following mordant or the denaturation polyvinyl alcohol for which a bridge can be constructed in addition to the above-mentioned polymer. Furthermore, a mean particle diameter can also use the polymer mordant containing less than 3-micrometer a particle, cation denaturation polyvinyl alcohol, or a quarternary-ammonium-salt machine. Moreover, into the ink-jet image recording medium of this invention, an interlayer, an under coat, etc. with the surface-protection layer and the various functions other than the ink fixed bed can be prepared if needed.

[0047] It is desirable that a mordant is included in the [mordant] ink fixed bed. It is desirable to use a mordant for the layer which makes polyvinyl alcohol a principal component especially. The polymer mordant which has the repeat unit expressed with the aforementioned general formula (1) as a mordant used is desirable. In a general formula (1), it differs, and it is desirable that they are a hydrogen atom, a methyl, or ethyl, and, as for R1, R2, and R3 and R4, it is still more desirable the same or that they are a hydrogen atom or a methyl. In L of a general formula (1), as for the carbon number of an alkylene machine, it is desirable that it is 1-6, as for the carbon number of an arylene machine, it is desirable that it is 6-14, and its phenylene is desirable especially. About L of a general formula (1), the example of the combination of an alkylene machine, an arylene machine, -CO-, -O-, and -NH- is shown below. The left-hand side of following Examples L1-L5 combines with a principal chain, and right-hand side combines with an imidazole ring, respectively.

an L1:-arylene machine-alkylene machine -- a -L2:-CO-O-L3:-CO-NH-L4:-CO-O-alkylene -- the example of the repeat unit which has the third class imidazole group expressed with a general formula (1) to below machine-L5:-CO-NH-alkylene machine - is shown

[0048]

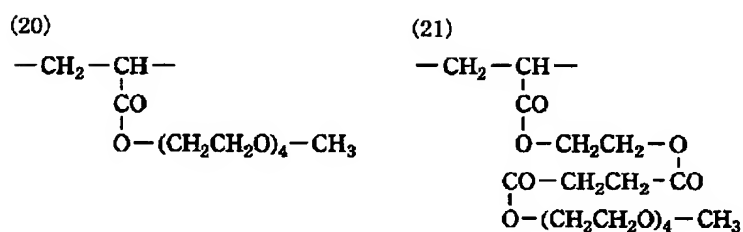
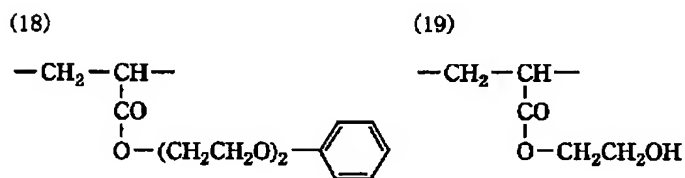
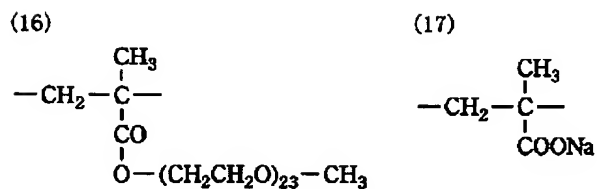
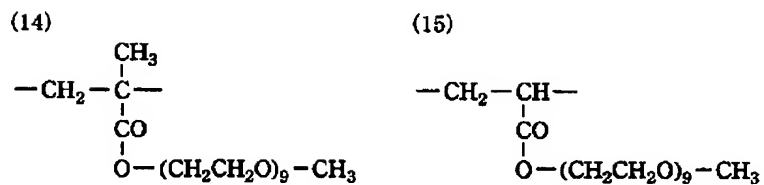
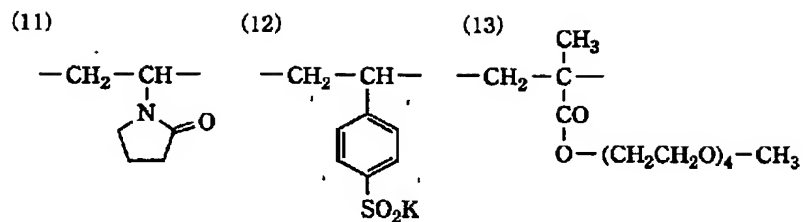
[Formula 12]



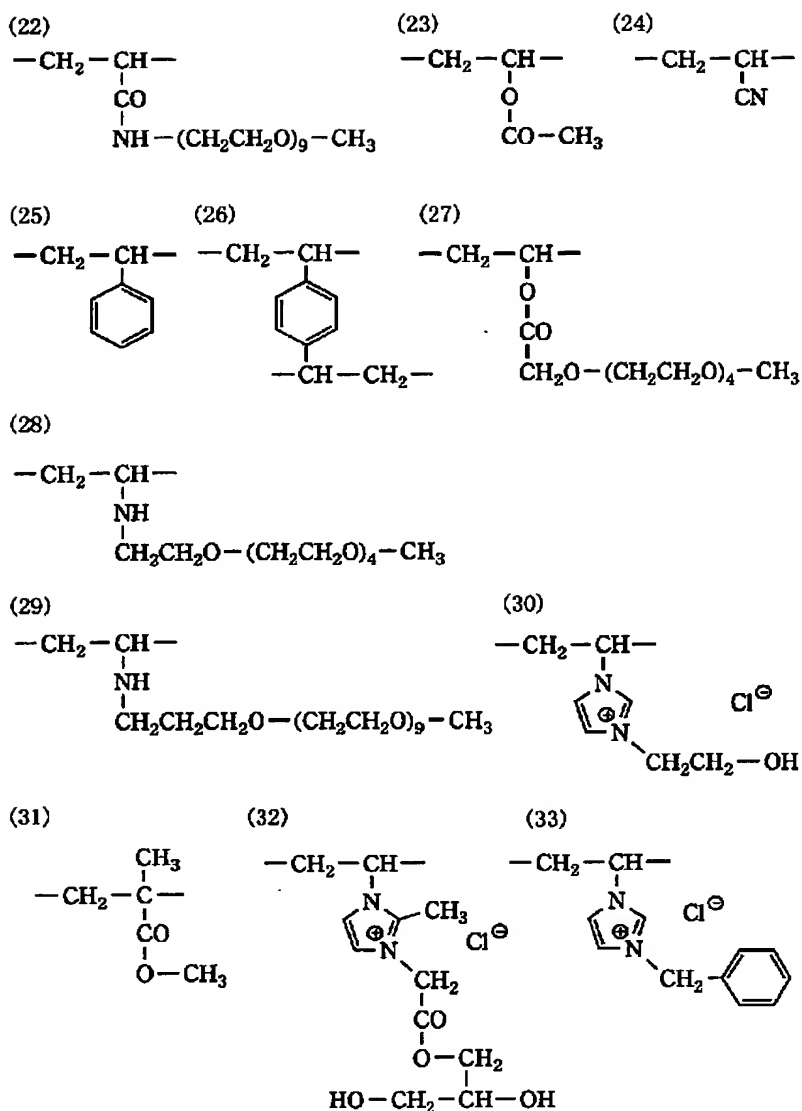
[0049] The homopolymer which consists only of a repeat unit which has the third class imidazole group can be used as a polymer mordant. Moreover, \*\*\*\* is also good considering the copolymer which combined two or more kinds of repeat units which have the third class imidazole group as a polymer mordant. Furthermore, the copolymer which combined the repeat unit which has the third class imidazole group, and other repeat units can also be used as a polymer mordant. As for the rate of the repeat unit which has the third class imidazole group in a copolymer, it is desirable that it is more than 50 mol %, and it is still more desirable that it is more than 60 mol %. The example of other repeat units is shown below.

[0050]

[Formula 13]



[0051]  
 [Formula 14]



[0052] The example of the copolymer which combined the repeat unit which has the third class imidazole group, and other repeat units is shown below. In addition, the number in a parenthesis means the number of the aforementioned repeat unit in the following examples. Moreover, the number on the right of a parenthesis is mol [ of a repeat unit ] %.

[0053]

----- copolymer The third class imidazole unit others -- unit (the 1) others -- unit (the 2)  
 ----- CPM-1 -(1)50- -(11)50-CPM-2 -(1)90- -(12)10-CPM-3 -(1)95- -(12)5 -CPM-4 -(1)  
 66- -(11)33- -(12)1 -CPM-5 -(1)95- -(13)5 -CPM-6 -(1)95- -(14)5 -CPM-7 -(1)95- - (15) 5-CPM-8 - (2)95- -(16)  
 5-CPM-9-(7)95- - (13) 5-CPM-10 -(10) 90 -- (15) 5- - (17) 5-CPM-11-(8)90- - (18) 5- - (19) 5-CPM-12 -(1)90- -  
 (20) 5- - (12) 5-CPM-13-(1)90- - (14) 5- - (12) 5-CPM-14 -(1)95- - (21) 5-CPM-15 -(1)90- -(22) 5- - (12) 5-CPM-  
 16-(10) 90- -(16) 5- - (12) 5-CPM-17 -(1)62.5- -(11) 31.25--(12) 6.25-CPM-18 -(1)50- - (23) 50-CPM-19-(1)75- -  
 (12) 25-CPM-20 -(1) 60 -- (11) 30- - (12) 10-CPM-21 -(1)60- - (24) 40-CPM-22 -(8)80- - (25) 15- - (26) 5-CPM-  
 23 -(1)70- -(13) 30-CPM-24 -(1)70- - (14) 20- - (12) 10-CPM-25 -(1)80- - (14) 20-CPM-26 -(1)65- -(27) 35-CPM-  
 27 -(1)70- - (28) 30-CPM-28-(1)65- - (29) 25- -(12) 10-CPM-29 -(1)90- - (30) 10-CPM-30 -(2)25- -(31) 50- -(32)  
 25-CPM-31 -(1)35--(24) 50- -(33) 15 ----- [0054] A polymer mordant is independent  
 one sort, or can be used combining two or more sorts. As for the molecular weight of a polymer mordant, it is  
 desirable that it is 1000-1 million, and it is still more desirable that it is 10000-200000. the amount of the polymer  
 mordant used -- 0.05 - 5 g/m2 it is -- things are desirable and it is still more desirable that it is 0.1 - 2.5 g/m2  
 Moreover, as for the amount of the polymer mordant used, it is desirable to use in the range of 5 - 30 mass % to  
 the alkylene oxide polymer used together in the same layer or PVA. It is the range of 10 mass % - 20 mass % still



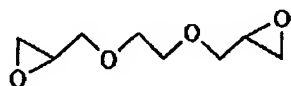
more preferably. When using a polymer mordant, it is desirable to use the following hardening agent together. [0055] the example of a [hardening agent] hardening agent -- an aldehyde compound (an example and formaldehyde --) A glyoxal, a glutaraldehyde, an aziridine compound, an isoxazole compound, an epoxy compound and a vinyl sulfone compound (an example, 1 and 3, and 5-thior chestnut roil-hexahydro-s-triazine --) Screw (vinyl sulfonyl) methyl-ether, N, and N'-ethylene-screw (vinyl sulfonyl acetamido) ethane, An N and N'-trimethylene-screw (vinyl sulfonyl acetamido), an acryloyl compound, a carbodiimide compound, and a triazine compound (an example --) 2, 4-dichloro-6-hydroxy-s-triazine, and N-methylol compound (an example --) a dimethylolurea, a methylol dimethylhydantoin, and a dioxane derivative (an example --) 2, 3-dihydroxy dioxane, and mucohalogenic acid (an example and mucochloric acid --) A muco phenoxy crawl acid, dialdehyde starch, 1-crawl-6-hydroxy thoriadinyl-ized gelatin, a maleimide compound, an acetylene compound, a boric-acid derivative, and methansulfonic acid ester are contained.

[0056] As an example of the desirable hardening agent used for this invention, a boric-acid derivative and the poly epoxy compound can be mentioned. The following are mentioned as an example of the poly epoxy compound.

[0057]

[Formula 15]

H-1



H-2



[0058] The dura mater possible denaturation polyvinyl alcohol used for a [dura mater possible denaturation polyvinyl alcohol] this invention is polyvinyl alcohol which has a reaction machine in [ one or more ] a molecule. Here, as a reaction machine, nucleophilic-reaction machines, such as an activity methylene group like the aceto acetyl group, an amino group, a hydroxyl group, and a carboxyl group, are desirable, and an activity methylene group is more desirable. The most desirable one contains the aceto acetyl group. As this example, go SEFAIMA Z100 and Z200 by the Nippon Synthetic Chemical Industry Co., Ltd. and Z210 grade are mentioned, for example. When using together the dura mater possible denaturation polyvinyl alcohol of this invention with alkylene oxide polymer or PVA, it is desirable to use 10mg/m 2-2g[m ] 2 as the amount used. It is 100 - 500 mg/m2 more preferably. Moreover, as for the amount of the dura mater possible denaturation polyvinyl alcohol used, it is desirable to use in the range of 5 - 30 mass % to the alkylene oxide polymer used together in the same layer or PVA. It is the range of 10 mass % - 20 mass % still more preferably.

[0059] When using dura mater possible denaturation polyvinyl alcohol, it is desirable by reacting with the above-mentioned reaction machine to use together the compound which has the basis which can construct a bridge in [ two or more ] a molecule. As a basis in which this reaction is possible, the amino group, a carbonyl hydrazine machine, an isocyanate machine, a methoxy methylamino machine, an aldehyde group (formalin is included), a metal salt, and an epoxy group are mentioned. An isocyanate machine and an epoxy group are mentioned as a desirable basis. These examples correspond to the above-mentioned hardening agent, and it is desirable more preferably to use together the compound which contains an epoxy group in [ two or more ] a molecule. The above-mentioned poly epoxy compound is mentioned as an example of a desirable compound.

[0060] You may add a tenebrescence inhibitor to the ink-jet image recording medium of a [tenebrescence inhibitor] this invention. As a tenebrescence inhibitor, an antioxidant, an ultraviolet ray absorbent, or a metal complex can be used. As an antioxidant, a chroman compound, a coumarane compound, a phenolic compound (an example, hindered phenol), a hydroquinone derivative, a hindered amine derivative, a SUPIRO indan compound, etc. are mentioned. The detail of these antioxidants is indicated by JP,61-159644,A. As an ultraviolet ray absorbent, a benzotriazol compound (U.S. JP,3533794,B specification publication), 4-thiazolidone compound (U.S. JP,3352681,B specification publication), a benzophenone compound (JP,46-2784,A publication), ultraviolet-absorption polymer (JP,62-260152,A publication), etc. are mentioned. As a metal complex, what is indicated by each official report of each specification of U.S. JP,4241155,B, said 4245018 numbers, and said 4254195 numbers, JP,61-88256,A, 62-174741, 63-199248, JP,1-75568,A, and 1-74272 can be used. The hindered amine derivative expressed with the SUPIRO indan compound and general formula (2) to which a desirable tenebrescence inhibitor is expressed with a general formula (2) is mentioned.

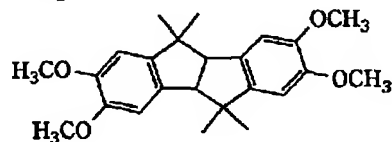
[0061] It is desirable from a viewpoint of picture shelf life to use the SUPIRO indan compound expressed with the

aforementioned general formula (2) in the layer of the record medium of the [SUPIRO indan compound] ink fixed bed and others. A general formula (2) is described in more detail. Even if the same the inside R1-R4 of a formula, it may differ, and it expresses an alkyl group. As a carbon number of an alkyl group, 1-20 are desirable, and, specifically, a methyl group, an ethyl group, n-propyl group, i-propyl group, n-butyl, t-butyl, n-octyl machine, a hexadecyl machine, etc. are mentioned. The following of the example of a SUPIRO indan compound expressed with a general formula (2) is carried out.

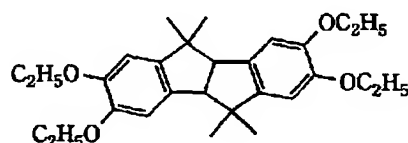
[0062]

[Formula 16]

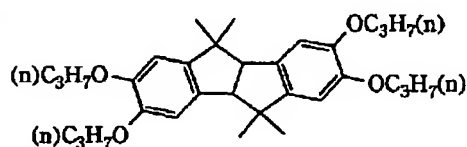
S - 1



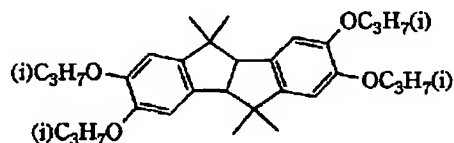
S - 2



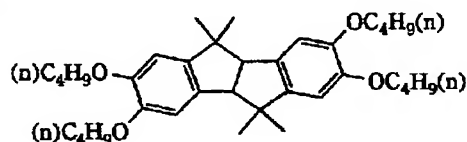
S - 3



S - 4



S - 5



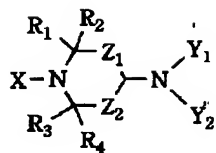
[0063] It is desirable from a viewpoint of picture shelf life to use the hindered amine derivative expressed with the aforementioned general formula (3) in the [hindered amine derivative] ink fixed bed and other layers. A general formula (3) is described in more detail. As a desirable example, a pyrrolidine ring, a piperazine ring, a morpholine ring, a piperidine ring, etc. are mentioned as 5 formed of Y - 7 member rings among a formula. As an alkyl group expressed with X, a methyl group, an ethyl group, n-propyl group, i-propyl group, n-butyl, t-butyl, n-octyl machine, a hexadecyl machine, etc. as an alkenyl machine An allyl group, an oleyl machine, etc. for example, as an alkynyl group An ethynyl machine etc. for example, as an aryl group A phenyl group, a naphthyl group, etc. for example, as an acyl group An acetyl group, a benzoyl, a PENTA noil machine, etc. for example, as a sulfonyl machine A methane sulfonyl machine, a benzenesulphonyl machine, a tosyl group, etc. for example, as a sulfinyl machine A methane sulfinyl machine, a benzene sulfinyl machine, a toluene sulfinyl machine, etc. for example, as an alkoxy group For example, a methyloxy machine, an ethyloxy machine, i-propyloxy machine, n-butyloxy machine, A phenoxy machine is mentioned as an aryloxy group and a cyclohexyloxy machine, n-octyloxy machine, t-octyloxy machine, a benzyloxy machine, etc. are mentioned, for example for an acetyloxy machine, a benzoyloxy machine, etc. as an acyloxy machine, for example. Each of these bases may have the substituent and a sulfonyl machine, a cull BOSHIRU machine, a carboxyl group, a hydroxyl, etc. are mentioned as this substituent. Even if R1-R4 are the same, they may differ from each other, and they express a hydrogen atom or an alkyl group. As an alkyl group, a methyl group, an ethyl group, n-propyl group, i-propyl group, n-butyl, t-butyl, n-octyl machine, a hexadecyl machine, etc. are mentioned.

[0064] The more desirable compound in a general formula (3) is a compound expressed with the following general formula (4).

[0065]

## [Formula 17]

一般式(4)



[0066] X expresses a hydrogen atom, a hydroxy group, an aliphatic machine, an acyl group, an aliphatic oxy-basis, an aliphatic oxy-carbonyl group, and an aryloxy carbonyl group among a formula, it may differ, even if the same, and a hydrogen atom and a substituent may be expressed, it may join together mutually, and Y1 and Y2 may form 5 members or 6 member rings. Z1 expresses the methylene group and ethylene which may have the mere joint hand and the substituent, and is Z2. The methylene group which may have the substituent is expressed. Even if R1, R2, R3, and R4 are the same, they may differ from each other, and they express an aliphatic machine. R1, and R2, R3 and R4 may join together mutually, respectively, and they may form 5 member rings or 6 member rings here.

[0067] the case where the basis in this detailed in the letter one contains an aliphatic part -- the aliphatic part -- a straight chain and branched chain -- or it may be annular, even if it is saturation, it may be unsaturated, for example, an alkyl, the alkenyl, cycloalkyl, and the cyclo alkenyl are expressed, and even if these did not replace, they may have the substituent Moreover, when an aryl part is included, the aryl part may be the condensed ring even if it is a monocycle, and even if not replaced, it may have the substituent. Moreover, when complex ring part grade is included, the complex ring part grade has a hetero atom, for example, a nitrogen atom, a sulfur atom, and an oxygen atom endocyclic, even if you may be an unsaturation ring even if it is a saturation ring, and it is a monocycle, it may be the condensed ring, and even if not replaced, it may have the substituent.

[0068] That the substituent in this invention should just be a replaceable basis For example, an aliphatic machine, An aryl group, a heterocycle machine, an acyl group, an acyloxy machine, the acylamino machine, An aliphatic oxy-basis, an aryloxy group, a heterocycle oxy-basis, an aliphatic oxy-carbonyl group, An aryl OKIJI carbonyl group, a heterocycle oxy-carbonyl group, a carbamoyl group, An aliphatic sulfonyl machine, an aryl sulfonyl machine, a heterocycle sulfonyl machine, An aliphatic sulfonyloxy machine, an arylsulfonyloxy machine, a heterocycle sulfonyloxy machine, A sulfamoyl group, an aliphatic sulfonamide machine, an aryl sulfonamide machine, A heterocycle sulfonamide machine, aliphatic amino-group, and arylamino machine, the heterocycle amino group, An aliphatic oxy-carbonyl-amino machine, an aryloxycarbonylamine machine, A heterocycle oxy-carbonyl-amino machine, an aliphatic sulfinyl machine, an aryl sulfinyl machine, An aliphatic thio machine, an aryl thio machine, a hydroxy group, a cyano group, a sulfonic group, A carboxyl group, the aliphatic oxy-amino group, the aryloxy amino group, A carbamoyl amino machine, a sulfamoylamino group, a halogen atom, a sulfamoyl carbamoyl group, a carbamoyl sulfamoyl group, a JI aliphatic oxy-force FINIRU machine, a diaryl oxy-force FINIRU machine, etc. can be raised.

[0069] A general formula (4) is explained in detail below. X as a hydrogen atom; hydroxy-group; aliphatic machine 20 or less carbon number which may have the substituent -- desirable -- a ten or less-carbon number alkyl group (an example --) 20 or less carbon number which may have; or substituents, such as a methyl group, an ethyl group, and 2-methanesulfon amide ethyl group, -- desirable -- a ten or less-carbon number alkenyl machine (an example --) An allyl group, a vinyl group, etc.; as an acyl group 20 or less carbon number which may have the substituent -- desirable -- ten or less acyl group (an example --) An acetyl group, a phenoxy acetyl group, etc.; 20 or less carbon number which may have the substituent as an aliphatic oxy-basis, desirable -- a ten or less-carbon number alkoxy group (an example, a methoxy machine, and an i-butoxy machine --) 20 or less carbon number which may have substituents, such as 2-ethylhexyloxy machine and a dodecyloxy machine desirable -- a ten or less-carbon number alkenoxy group (an example and a vinyloxy machine --) Aryloxy group etc.; 20 or less carbon number which may have the substituent as an aliphatic oxy-carbonyl group, desirable -- a ten or less-carbon number alkoxy carbonyl group (an example and a methoxycarbonyl group --) 20 or less carbon number which may have substituents, such as a phenoxy ethoxycarbonyl machine and a dodecyloxy carbonyl group 20 or less carbon number which may have the substituent preferably as a ten or less-carbon number ARUKENOKISHI carbonyl group (example, allyloxy carbonyl group, etc.); aryloxy dicarbonyl machine -- desirable -- ten or less aryloxy carbonyl group (an example and a phenoxy carbonyl group --) 4-methoxycarbonyl group, 3-chloro phenoxy carbonyl group, etc. are expressed.

[0070] Y1 and Y2 are the same -- or -- differing -- a basis (an example --) replaceable as a hydrogen atom and a substituent An aliphatic machine, an aryl group, a heterocycle machine, an acyl group, an aliphatic oxy-carbonyl

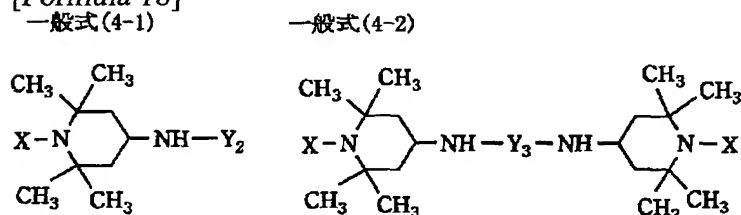
group, An aryl OKIJI carbonyl group, a heterocycle oxy-carbonyl group, a carbamoyl group, A sulfamoyl carbamoyl group, an aliphatic sulfonyl machine, an aryl sulfonyl machine, a heterocycle sulfonyl machine, a sulfamoyl group, a phosphoryl machine, a phosphonyl group, etc. may be expressed, it may join together mutually, and 5 member rings or 6 member rings (an example, a morpholine ring, pyrrolidine ring, etc.) may be formed. Z1 expresses the methylene group and ethylene which may have the mere joint hand, and the substituent (an example, alkyl group), and Z2 expresses the methylene group which may have the substituent (an example, alkyl group). R1, R2, R3, and R4 are the same -- or it differs and an aliphatic machine (ten or less carbon number which may have the substituent preferably five or less alkyl group for example, a methyl group, an ethyl group, a propyl group) is expressed R1, and R2, R3 and R4 may join together mutually, respectively, and they may form 5 member rings or 6 member rings (an example, cyclohexane ring) here.

[0071] The achievement viewpoint of the purpose of this invention to X is the case where it is a hydrogen atom or an aliphatic machine that they are a hydrogen atom, a hydroxy group, an aliphatic machine, or an aliphatic oxy-basis desirable still more preferably, and it is a hydrogen atom most preferably. Similarly it is desirable that one side of Y1 and Y2 is a hydrogen atom, and Y1 is a hydrogen atom. Y2 And an acyl group, an aliphatic oxy-carbonyl group, an aryl OKIJI carbonyl group, A GARUBA moi machine, a sulfamoyl carbamoyl group, an aliphatic sulfonyl machine, An aryl sulfonyl machine, sulfamoyl group, phosphoryl machine, or phosphonyl group \*\*\*\*\* case is still more desirable. Y1 is a hydrogen atom, and it is the most desirable when Y2 is an acyl group, an aliphatic oxy-carbonyl group, a carbamoyl group, an aliphatic SUHONIRU machine, a sulfamoyl group, a phosphoryl machine, and a phosphonyl group. Similarly, the case where the ring which Z1 and Z2 form is 5 member rings or 6 member rings is desirable, and they are a non-replaced methylene group, and when 6 member rings are formed, it is still more desirable [ Z1 and Z2 / it is a mere joint hand and a methylene group, and ]. Similarly, all of R1, R2, R3, and R4 have especially the desirable case where it is a methyl group.

[0072] Next, the desirable structure of the general formula (4) of this invention is described. The compound expressed with the following general formula (4-1) and (4-2) from a viewpoint of achievement of the purpose of this invention is desirable.

[0073]

[Formula 18]



[0074] X and Y2 </SUB> are the same as what the general formula (4) defined among a formula. Y3 is the divalent acyl group which may have a mere joint hand or divalent basis [, for example, a sulfonyl machine, the carbonyl group, the HOSUHORIRU machine, the phosphonyl group, and the substituent. desirable -- a carbon number -- ten -- less than -- further -- desirable -- a carbon number -- six -- less than -- an acyl group (example, oxalyl machine, malonyl machine, succinyl machine, glutaryl machine, horse mackerel POIRU machine, -CO (CH2CH2O)1 - 3CH2CH2CO-) -- or -- a carbon number -- ten -- less than -- further -- desirable -- six -- less than -- a substituent -- having -- \*\*\*\* -- divalent -- a sulfonyl -- a machine -- it is (an example, 1

[0075] In a general formula (4-1) and (4-2), the case where X is a hydrogen atom, Y2 is an acyl group, an alkyl sulfonyl machine, a HOSUHORIRU machine, or a phosphonyl group, and Y3 is a divalent acyl group, a HOSUHORIRU machine, or a phosphonyl group from a viewpoint of achievement of the purpose of this invention is desirable. It is still more desirable, when X is a hydrogen atom, Y2 is an alkyl sulfonyl machine and Y3 is a divalent acyl group. Moreover, the compound expressed with a general formula (4-2) is more desirable than a general formula (4-1).

[0076] Although the example of a concrete compound expressed with the general formula (4) of this invention below is shown, this invention is not limited to this.

[0077]

[Table 1]

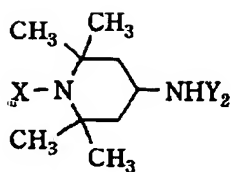





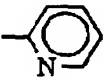


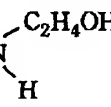

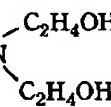
表 1

No	X	Y <sub>2</sub>	No	X	Y <sub>2</sub>
a-1	H	H	a-16	-OH	-COCH <sub>3</sub>
a-2	H		a-17	-OC <sub>8</sub> H <sub>17</sub> (n)	-SO <sub>2</sub> CH <sub>3</sub>
a-3	H	-CONHC <sub>3</sub> H <sub>7</sub> (n)	a-18	-OCH <sub>3</sub>	-SO <sub>2</sub> CH <sub>3</sub>
a-4	H	-CONHC <sub>2</sub> H <sub>5</sub>	a-19	-COCH <sub>3</sub>	-COCH <sub>3</sub>
a-5	H		a-20	-COOCH <sub>3</sub>	-COOCH <sub>3</sub>
a-6	H		a-21		
a-7	H	-COCH <sub>2</sub> OH	a-22	-CH <sub>3</sub>	-COOC <sub>2</sub> H <sub>5</sub>
a-8	H	-COCH <sub>2</sub> OCOCH <sub>3</sub>	a-23	-C <sub>2</sub> H <sub>5</sub>	-COCH <sub>2</sub> OH
a-9	H	-COCH <sub>3</sub>	a-24	-CH <sub>3</sub>	
a-10	H	-SO <sub>2</sub> CH <sub>3</sub>	a-25	-O <sup>•</sup>	-NH <sub>2</sub> SO <sub>2</sub> CH <sub>3</sub>
a-11	H	-COCH <sub>2</sub> OCH <sub>3</sub>	a-26	H	-SO <sub>2</sub> C <sub>2</sub> H <sub>5</sub>
a-12	H	-COOCH <sub>3</sub>	a-27	H	-SO <sub>2</sub> C <sub>4</sub> H <sub>9</sub> (n)
a-13	H	-COC <sub>2</sub> H <sub>5</sub>	a-28	H	
a-14	H	-SO <sub>2</sub> NHC <sub>2</sub> H <sub>5</sub>	a-29	H	
a-15	H		a-30	H	-CONHC <sub>3</sub> H <sub>7</sub> (i)

[0078]

[Table 2]

表 1 続き

No	X	Y <sub>2</sub>	No	X	Y <sub>2</sub>
a-31	H	-CONHC <sub>4</sub> H <sub>9</sub> (n)	a-41	H	-CH <sub>3</sub>
a-32	H	-CONH- 	a-42	H	-  -NHCOCH <sub>3</sub>
a-33	H	-CONH- 	a-43	H	-CONHSO <sub>2</sub> N(CH <sub>3</sub> ) <sub>2</sub>
a-34	H	$\text{O}$ $\parallel$ -P-(OC <sub>2</sub> H <sub>5</sub> ) <sub>2</sub>	a-44	H	- 
a-35	H	$\text{O}$ $\parallel$ -P-(OCH <sub>3</sub> ) <sub>2</sub>	a-45	H	$\text{O}$ $\parallel$ -P(CH <sub>3</sub> )(OCH <sub>3</sub> )
a-36	H	-SO <sub>2</sub> CH <sub>2</sub> OH	a-46	H	-SO <sub>2</sub> -  -OH
a-37	H	-SO <sub>2</sub> CH <sub>2</sub> Cl	a-47	H	-SO <sub>2</sub> CH <sub>2</sub> OCH <sub>3</sub>
a-38	H	-C <sub>4</sub> H <sub>8</sub> -SO <sub>3</sub> Na	a-48	H	-COCH <sub>2</sub> CH <sub>2</sub> OH
a-39	-CH <sub>3</sub>	-CON- 	a-49	H	-CON- 
a-40	-C <sub>4</sub> H <sub>9</sub> (n)	-CON- 	a-50	H	-CON- 

[0079]

[Table 3]

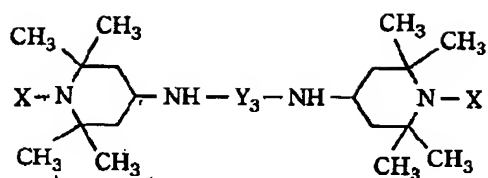


表 2

No	X	Y <sub>3</sub>
a-51	H	$\begin{array}{c} \text{---C---C---} \\    \quad    \\ \text{O} \quad \text{O} \end{array}$
a-52	H	$\begin{array}{c} \text{---CCH}_2\text{CH}_2\text{C---} \\    \quad \quad    \\ \text{O} \quad \quad \text{O} \end{array}$
a-53	H	$\begin{array}{c} \text{---CCH}_2\text{OCH}_2\text{C---} \\    \quad \quad    \\ \text{O} \quad \quad \text{O} \end{array}$
a-54	H	$\begin{array}{c} \text{---CCH}_2\text{CH}_2\text{CH}_2\text{C---} \\    \quad \quad \quad    \\ \text{O} \quad \quad \quad \text{O} \end{array}$
a-55	H	$\begin{array}{c} \text{---CCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{C---} \\    \quad \quad \quad \quad    \\ \text{O} \quad \quad \quad \quad \text{O} \end{array}$
a-56	H	$\begin{array}{c} \text{---C---(CH}_2)_8\text{---C---} \\    \quad \quad \quad    \\ \text{O} \quad \quad \quad \text{O} \end{array}$
a-57	H	$\begin{array}{c} \text{---CCH=CHC---} \\    \quad \quad    \\ \text{O} \quad \quad \text{O} \end{array} \text{ (Trans)}$
a-58	H	$\begin{array}{c} \text{---CCH=CHC---} \\    \quad \quad    \\ \text{O} \quad \quad \text{O} \end{array} \text{ (Cis)}$
a-59	H	$\begin{array}{c} \text{---CNH---(CH}_2)_6\text{---NHC---} \\    \quad \quad \quad    \\ \text{O} \quad \quad \quad \text{O} \end{array}$
a-60	H	$\begin{array}{c} \text{---C---} \text{C}_6\text{H}_4 \text{---C---} \\    \quad \quad \quad    \\ \text{O} \quad \quad \quad \text{O} \end{array}$
a-61	H	$\begin{array}{c} \text{---C---} \text{C}_6\text{H}_4 \text{---SO}_2\text{---} \\    \quad \quad \quad \\ \text{O} \end{array}$
a-62	H	$\begin{array}{c} \text{---SO}_2\text{---} \text{C}_6\text{H}_4 \text{---SO}_2\text{---} \\ \quad \quad \quad \\ \text{SO}_2\text{---} \end{array}$
a-63	H	$\begin{array}{c} \text{---CNHCH}_2\text{---} \text{C}_6\text{H}_4 \text{---CH}_2\text{NHC---} \\    \quad \quad \quad \quad \quad    \\ \text{O} \quad \quad \quad \quad \quad \text{O} \end{array}$

[0080]

[Table 4]

表 2 続き

No	X	Y <sub>3</sub>
a-64	H	
a-65	H	
a-66	H	
a-67	H	
a-68	H	
a-69	H	
a-70	H	
a-71	H	
a-72	H	
a-73	H	
a-74	CH <sub>3</sub>	
a-75	CH <sub>3</sub>	

[0081]  
[Table 5]



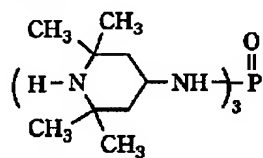
表 2 続き

No	X	Y <sub>3</sub>
a-76	CH <sub>3</sub>	—SO <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> SO <sub>2</sub> —
a-77	CH <sub>3</sub>	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{P}- \\   \\ \text{OC}_2\text{H}_5 \end{array}$
a-78	CH <sub>3</sub>	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{C}_6\text{H}_4-\text{SO}_2- \\ \parallel \\ \text{O} \end{array}$
a-79	H	$\begin{array}{c} \text{O} \qquad \qquad \text{O} \\ \parallel \qquad \qquad \parallel \\ -\text{CCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{C}- \\ \parallel \qquad \qquad \parallel \\ \text{O} \qquad \qquad \text{O} \end{array}$
a-80	CH <sub>3</sub>	—SO <sub>2</sub> —
a-81	—COCH <sub>3</sub>	$\begin{array}{c} \text{O} \qquad \qquad \text{O} \\ \parallel \qquad \qquad \parallel \\ -\text{CCH}_2\text{CH}_2\text{C}- \\ \parallel \qquad \qquad \parallel \\ \text{O} \qquad \qquad \text{O} \end{array}$

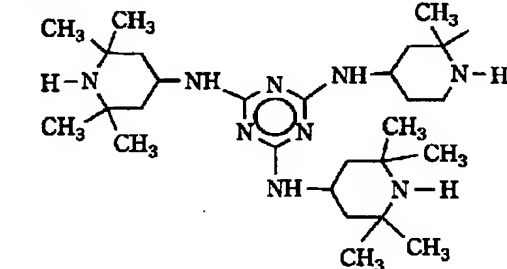
[0082]

[Formula 19]

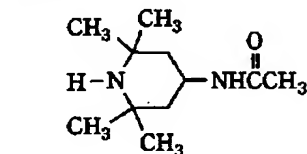
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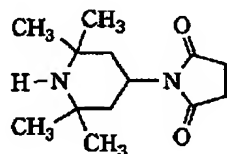
(a-83)



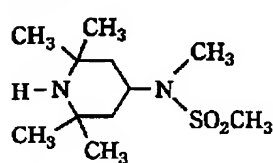
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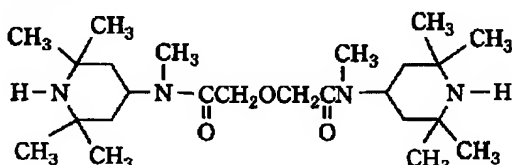
(a-85)



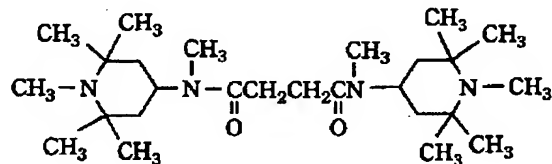
(a-86)



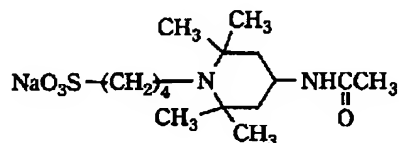
(a-87)



(a-88)



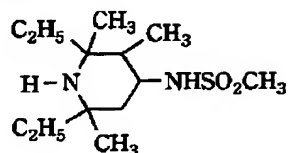
(a-89)



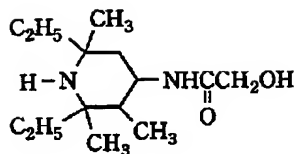
[0083]

[Formula 20]

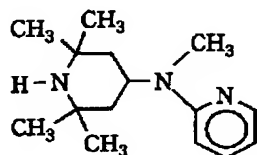
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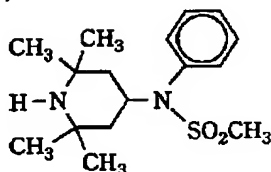
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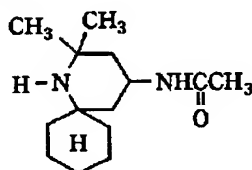
(a-92)



(a-93)



(a-94)



[0084] Next, an example of the synthesis method of a compound expressed with a general formula (4) is shown. Synthetic 4- $\alpha$ -(a-53)amino-2,2,6,6-tetramethylpiperidine 46.8g (0.300 mols) was melted to dimethylformamide 130ml, and jig RIKORIRU chloride 25g (0.146 mols) was dropped at the bottom of churning in 20 minutes at 8 degrees C. At this time, temperature was stopped by 20 degrees C by the water bath. It stirred for 30 minutes at 20 degrees C after dropping, and acetonitrile 400ml was added. The crystal which deposited was filtered and it washed by going out acetonitrile 100ml. Yield was 75g. On the other hand, 16g of potassium hydroxides was dissolved in methanol 300ml, and the crystal obtained under churning at 25 degrees C was added. Reduced pressure distilling off of the methanol was carried out, and it dissolved by chloroform 300ml (the crystal of potassium chloride has not melted), and magnesium sulfate was added and it dried. Chloroform was distilled off the back according to \*\* and sulfuric-acid magnesium was cooled after the hot-bath solution by acetonitrile 300ml. The crystal which deposited was filtered, he went out cold acetonitrile 100ml, and it washed, and carried out, and the obtained crystal was dried. They were the yield of 38.8g, 63% of yield, and 122-124 degrees C of melting points.

[0085] A [surface-protection layer] surface-protection layer is an ink transparency layer (protective layer) which uses the polymer of hydrophilic properties, such as gelatin, a saccharide, and a water-soluble synthetic macromolecule, as a binder. hydrophilic polymer -- more than 50 mass % of a layer -- desirable -- more than 55 mass % -- a pan -- more than 60 mass % is occupied preferably As for a surface-protection layer, it is desirable to contain a mat agent and a surfactant further. Addition of a mat agent has a large effect to improvement in the physical shelf life of the picture which is the purpose of this invention. A surface-protection layer has the function which controls the breadth and penetration of ink. Furthermore, a surface-protection layer also has the function to protect physically or chemically the coloring matter picture fixed to the ink absorption layer. In this invention, it can serve as a surface-protection layer with one of the ink fixed beds. In this case, it is desirable to serve with one of the ink fixed beds which make the above-mentioned polyvinyl alcohol a principal component. As for the surface-protection layer which does not serve as the ink fixed bed, it is desirable to have the thickness of 0.2-2 micrometers. More desirable thickness is 0.3-1 micrometer.

[0086] A slipping agent, antiseptics, a high-boiling point organic solvent, a polymer latex, a tenebrescence inhibitor, a tint attachment color, a pigment, a fluorescence \*\*\*\* agent, etc. can be used for a surface-protection layer if needed. Antiseptics, a high-boiling point organic solvent, a polymer latex, a tenebrescence inhibitor, a tint

attachment color, a pigment, a fluorescence \*\*\*\* agent, etc. can be similarly used for the ink fixed beds other than a surface-protection layer, an interlayer, an under coat, etc. if needed.

[0087] As a mat agent used for a [mat agent] surface-protection layer, the particle whose mean particle diameter is 3-100 micrometers is desirable. As for the mean particle diameter of a mat agent particle, it is more desirable that it is 10-100 micrometers, and it is still more desirable that it is 10-30 micrometers. Moreover, as for the mean particle diameter of a mat agent particle, it is desirable that it is larger than the bed depth of the layer which added it at least.

[0088] Both an inorganic particle and an organic particle can be used for the particle used as a mat agent. As the above-mentioned inorganic particle (inorganic mat agent), an oxide (an example, a silicon dioxide, titanium oxide, a magnesium oxide, aluminum oxide), an alkaline-earth-metal salt (an example, a barium sulfate, a calcium carbonate, magnesium sulfate), a silver halide (an example, a silver chloride, silver bromide), glass, etc. are mentioned.

[0089] As the above-mentioned organic particle (organic mat agent), particles, such as starch, a cellulose ester (an example, cellulose acetate propionate), a cellulose ether (an example, ethyl cellulose), and synthetic resin, etc. are mentioned. As for the above-mentioned synthetic resin, it is desirable that they are water-insoluble nature or damage-at-sea solubility. as the example of the synthetic resin of water-insoluble nature or damage-at-sea solubility -- the poly (meta) acrylic ester (an example --) Poly alkyl (meta) acrylate, poly alkoxy alkyl (meta) acrylate, Poly glycidyl (meta) acrylate, the poly (meta) acrylamide, Polyvinyl ester (an example, polyvinyl acetate), a polyacrylonitrile, A polyolefine (an example, polyethylene), polystyrene, a benzoguanamine resin, formaldehyde condensation polymer, an epoxy resin, a polyamide, a polycarbonate, phenol resin, a polyvinyl carbazole, a polyvinylidene chloride, etc. are mentioned. You may use the copolymer which combined the repeat unit of the above polymer.

[0090] As a mat agent, you may use together two or more kinds of particles. As for the amount of the particle used, it is desirable that it is 0.01 - 0.5 g/m<sup>2</sup>, and it is still more desirable that it is 0.02 - 0.3 g/m<sup>2</sup>.

[0091] In a [surfactant] gelatin layer or a polyvinyl alcohol layer, you may add a surfactant. A surfactant functions as an application assistant, an antistatic agent, a slide nature improvement agent, an emulsification dispersant, or an adhesion inhibitor. A nonionic surface active agent, an anionic surface active agent, a cationic surface active agent, or an amphoteric surface active agent can be used. the example of a nonionic surface active agent -- a steroid (an example, saponin) and an alkylene oxide derivative (an example --) A polyethylene glycol, a polyethylene glycol / polypropylene-glycol condensate, A polyethylene glycol alkyl ether, the polyethylene-glycol alkyl aryl ether, A polyethylene glycol ester, polyethylene-glycol sorbitan ester, A polyalkylene glycol alkylamine and polyalkylene glycol alkylamide The polyethylene-oxide addition product of silicone, a glycidol derivative (an example, an alkenyl succinic-acid poly glyceride, alkylphenol poly glyceride), alkyl ester (an example, fatty acid ester of polyhydric alcohol), etc. are mentioned.

[0092] An alkyl carboxylate, an alkyl-sulfonic-acid salt, an alkylbenzene sulfonate, an alkyl naphthalene sulfonate, alkyl-sulfuric-acid ester, alkyl phosphoric ester, an N-acyl-N-alkyl taurine acid, sulfo succinic-acid ester, sulfoalkyl polyoxyethylene alkylphenyl ether, polyoxyethylene alkyl eicosanoic-acid ester, etc. are mentioned as the example of an anionic surface active agent. Alkylamine salt, aliphatic series or aromatic quarternary-ammonium-salt, and heterocycle quarternary ammonium salt, phosphonium salt, sulfonium salt, etc. are mentioned as the example of a cationic surface active agent. Amino acid, an amino alkyl sulfonic acid, an amino alkyl sulfuric acid, an amino alkyl phosphoric acid, an alkyl betaine, an amine oxide, etc. are mentioned as the example of an amphoteric surface active agent. As for the amount of the surfactant used, it is desirable that it is 0.005 - 0.5 g/m<sup>2</sup>, and it is still more desirable that it is 0.01 - 0.1 g/m<sup>2</sup>.

[0093] You may add a slide agent in a [slide agent] surface-protection layer. High-class sodium alkylsulfate and higher-fatty-acid higher-alcohol ester, Carbowax, high-class alkyl phosphoric ester, a silicon compound, etc. are mentioned as the example of a slide agent. As for the amount of the slide agent used, it is desirable that it is 5 - 200 mg/m<sup>2</sup>.

[0094] In the application layer of a [antiseptics] image recording medium, especially the layer containing water-soluble polymer, it is desirable to add antiseptics (an antimicrobial agent or \*\* motorcycle agent). The water-soluble thing of antiseptics is desirable. For the example of water-soluble antiseptics, a thiazolyl benzimidazole compound, an iso thiazolone compound, A chlorophenol compound, a BUROMO phenolic compound, a thiocyanic-acid compound, An isothiocyanic acid compound, an acid-azide compound, a diamond gin compound, a triazine compound, A thiourea compound, an alkyl guanidine compound, quarternary ammonium salt, An organotin compound, an organic zinc compound, a cyclohexyl phenolic compound, An imidazole compound, a

benzimidazole system compound, a sulfamide compound, an activity halogenated compound (an example, chlorinated-isocyanuric-acid sodium), a chelating agent, a sulfurous-acid compound, an antibiotic (an example, penicillin), etc. are mentioned. About antiseptics, each official report and the Horiguchi \*\*\*\* "chemistry of antimicrobial mildewproofing" (Showa 57 Sankyo Publishing Co., Ltd.) of the L.E. waist (L. E. West), water quality criteria ("Water Quality Criteria") Phot.Sci.and Eng., Vol9, No.6 (1965), JP,55-111942,A, 57-8542, 57-157244, 58-105145, and 59-126533 have a publication.

[0095] In the application layer (layer containing a back layer) of a [high-boiling point organic-solvent] image recording medium, you may add a high-boiling point organic solvent. A high-boiling point organic solvent functions as a plasticizer, a slide agent, or a curl inhibitor. About a high-boiling point organic solvent, JP,62-245253,A has a publication. As a high-boiling point organic solvent, you may use a silicone oil (an example, a dimethyl silicone oil, denaturation silicone oil that introduced various kinds of organic machines into dimethylsiloxane). About a silicone oil, each official report of JP,62-215953,A and 63-46449 has a publication.

[0096] In the application layer (layer containing a back layer) of a [polymer latex] image recording medium, you may add a polymer latex. Addition of a polymer latex acquires the effect of dimension stabilization, curl prevention, adhesion prevention, or crack prevention. The low (less than 40 degrees C) polymer of a glass transition temperature is excellent in the operation of curl prevention or crack prevention. Moreover, even if a glass transition temperature adds high polymer in a back layer, the curl prevention effect is acquired. About a polymer latex, each official report of JP,62-245258,A, 62-1100668, and 62-131664 has a publication.

[0097] In the application layer (layer containing a back layer) of a [tint attachment color and pigment] image recording medium, you may add a tint attachment color and a pigment. A large well-known thing can be used as a color and a pigment. As these examples, what is indicated by 873 etc. pages of 25-26 pages, and the 649-page right column of RD No. 18716 - the 650-page left column of RD No. 17643, and RD No. 307105 etc. is mentioned, for example.

[0098] To a [fluorescent brightener] image recording medium, you may add a fluorescent brightener. A stilbene compound, a coumarin compound, a biphenyl compound, a benzoxazolyl compound, a NAFUTARU imide compound, a pyrazoline compound, a KARUBO styryl compound, etc. are mentioned as the example of a fluorescent brightener. a fluorescent brightener -- the volume on K.Veenkataraman "The Chemistry of Synthetic Dyes" -- the 5th volume, an octavus chapter, and JP,61-143752,A have a publication

[0099] In the layer which [mean particle diameter prepared between less than 3-micrometer the particle] ink fixed bed or the ink fixed bed, and the base material, a mean particle diameter can add a less than 3-micrometer particle for the purpose of adjustment of the rate of absorption of ink, prevention of adhesion, a strong improvement, or improvement of curl balance. As a less than 3-micrometer particle, an inorganic pigment is preferably used for a mean particle diameter. A silica pigment, an alumina pigment, a titanium-dioxide pigment, a zinc-oxide pigment, a zirconium-oxide pigment, a micaceous iron oxide, the white lead, a lead-oxide pigment, a cobalt oxide pigment, a strontium clo mate, a molybdenum system pigment, a smectite, a magnesium-oxide pigment, a calcium-oxide pigment, a calcium-carbonate pigment, a mullite, etc. are mentioned as the example of an inorganic pigment. Especially, a silica pigment and an alumina pigment are desirable. You may use together two or more kinds of particles. All can be used although there are a spherical silica and an amorphous silica in a silica pigment. A silica pigment is compoundable by dry process, the wet method, or the aerogel method. You may carry out surface treatment of the front face of a hydrophobic silica particle with a trimethylsilyl machine or silicone. Especially a colloid silica is desirable. As for the mean particle diameter of a silica pigment, it is desirable that it is 4-120nm, and it is still more desirable that it is 4-90nm. As for a silica pigment, it is desirable that it is porosity. As for the average aperture of a porosity particle, it is desirable that it is 50-500nm. the average per mass of a porosity particle -- a hole -- as for capacity, it is desirable that it is 0.5 - 3 ml/g

[0100] An anhydrous alumina, a hydrated alumina, etc. are mentioned to an alumina pigment. As a crystallized type of an anhydrous alumina, alpha, beta, gamma, delta, zeta, eta, theta, kappa, rho, or chi can be used. The hydrated alumina is more desirable than an anhydrous alumina. Things can be carried out using a monohydrate or three hydrates as a hydrated alumina. A pseudo-boehmite, a boehmite, a diaspora, etc. are mentioned to a monohydrate. three hydrates -- a jib -- a site and a bayerite are mentioned As for the mean particle diameter of an alumina pigment, it is desirable that it is 4-300nm, and it is still more desirable that it is 4-200nm. As for an alumina pigment, it is desirable that it is porosity. As for the average aperture of a porosity particle, it is desirable that it is 50-500nm. the average per mass of a porosity particle -- a hole -- as for capacity, it is desirable that it is 0.3 - 3 ml/g A hydrated alumina is compoundable by the method of understanding the sol gel process which ammonia is added [ sol gel process ] and settles it in aluminum salting-in liquid, or ulmin acid alkali an added

water part. An anhydrous alumina can be obtained by dehydrating a hydrated alumina by heating. It is a dry-mass ratio to the binder (gelatin or PVA system polymer) of the layer to add, as for the amount of the inorganic pigment used, it is desirable that it is five to 100 mass %, and it is still more desirable that it is 20 to 70 mass %.

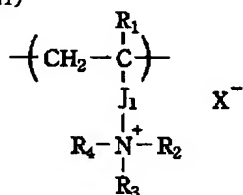
[0101] It is also desirable to use cation denaturation polyvinyl alcohol for the [cation denaturation polyvinyl alcohol] ink fixed bed. Cation denaturation polyvinyl alcohol is obtained by saponifying the copolymer of the ethylenic unsaturated monomer and vinyl acetate which have a cation nature machine. As an ethylenic unsaturated monomer which has a cation nature machine For example, TORIMECHIRU-(2-acrylamide -2, 2-dimethyl ethyl) ammoniumchloride, TORIMECHIRU-(3-acrylamide -3, 3-dimethyl propyl) ammoniumchloride, N-vinyl imidazole, an N-vinyl-2-methyl imidazole, N-(3-dimethylamino propyl) methacrylamide, Hydroxyl ethyl trimethylammonium chloride, TORIMECHIRU-(- methacrylamide propyl) ammoniumchloride, N-(1 and 1-dimethyl-3-dimethylamino propyl) acrylamide, etc. are mentioned.

[0102] It is also desirable to use the polymer mordant containing a quarternary-ammonium-salt machine for the [polymer mordant containing quarternary-ammonium-salt machine] ink fixed bed. The polymer mordant containing a quarternary-ammonium-salt machine is a polymer expressed with the following general formula (L).  
General formula (L)

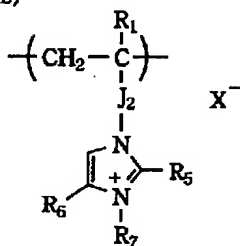
- A expresses the repeat unit guided from the monomer which has the 4th class ammonium, and which can be copolymerized among a (A)<sub>x</sub>-(B)<sub>y</sub>-(C)<sub>z</sub>-formula, B expresses the repeat unit guided from the monomer which has at least two ethylene nature unsaturation machines, and which can be copolymerized, and C expresses the repeat unit guided from the monomer which has ethylene nature unsaturation machines other than A and B at least, and which can be copolymerized. x is [ z of y ] 0-90-mol % 0-10-mol% 10-98-mol%. a general formula (L) -- setting -- A -- especially -- desirable -- the following general formula (LA1) -- or (LA2) (LA3) it is expressed [0103]

[Formula 21]

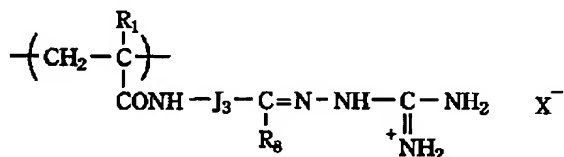
一般式(LA1)



### 一般式(LA2)



### 一般式(LA3)

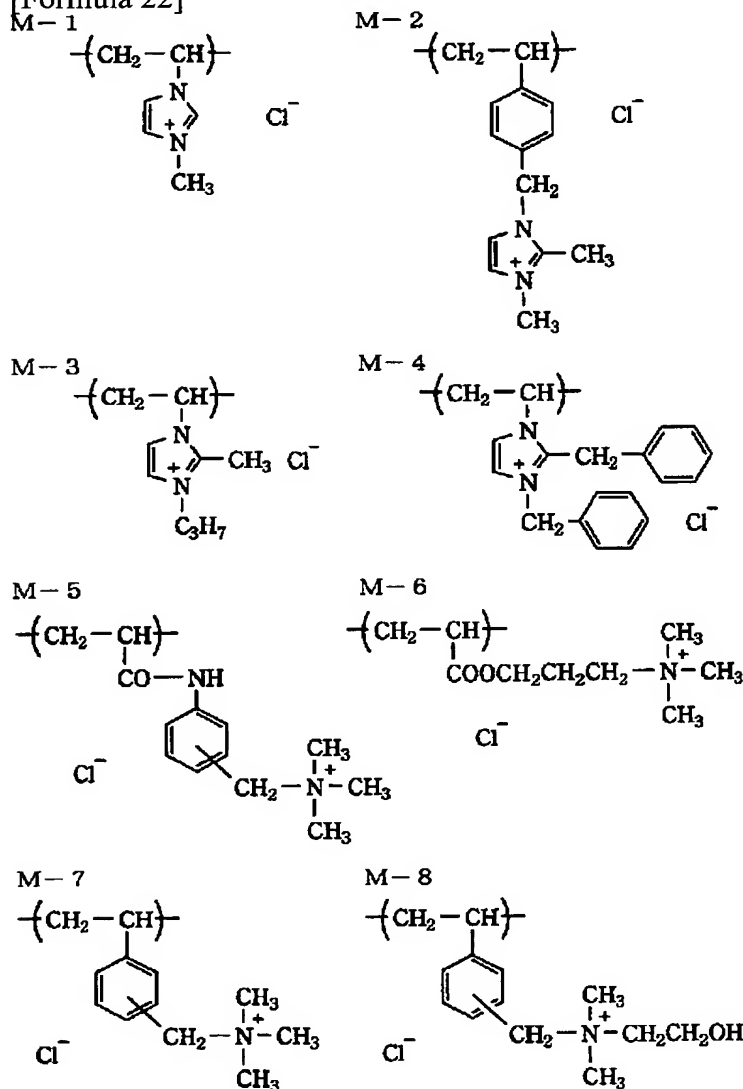


[0104] In a general formula (LA1), as for R1, a hydrogen atom or a carbon atomic number expresses the alkyl group of 1-4. J1 expresses a divalent connection machine and expresses the benzyl which is not replaced [substitution or] or -COQ-. A carbon number is the divalent connection machine of 1-20, for example, Q expresses an alkylene machine, an arylene machine, a -O-R0-machine, and a -NH-R0-machine (R0 shows an alkylene machine, an arylene machine, an aralkyl machine, etc.). As for R2-R4, the alkyl group of the carbon atomic numbers 1-18 or a carbon atomic number may express the aralkyl machine of 7-18, and these alkyl groups or the aralkyl machine may have the substituent. X- expresses an anion, for example, expresses halogen ion, alkyl

sulfonic-acid ion, aryl sulfonic-acid ion, acetic-acid ion, etc. In a general formula (LA2), J2 expresses a mere joint hand or divalent connection machines (an alkylene machine, an arylene machine, aralkylene group, etc.). R1 is R1 and homonymy of a general formula (LA1). R5 and R6 are the same -- or it differs and a hydrogen atom, an alkyl group, or an aralkyl machine is expressed R7 expresses an alkyl group or an aralkyl machine. X- expresses an anion. In a general formula (LA3), R1 is R1 and homonymy of a general formula (LA1). R8 expresses an alkyl group and X- expresses an anion. J3 expresses a mere joint hand or divalent connection machines (an alkylene machine, an arylene machine, or an aralkylene group etc. which may have the substituent, respectively). [0105] The example of the monomer which forms the repeat unit expressed with A of a general formula (L) is shown below.

[0106]

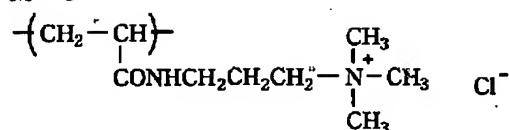
[Formula 22]



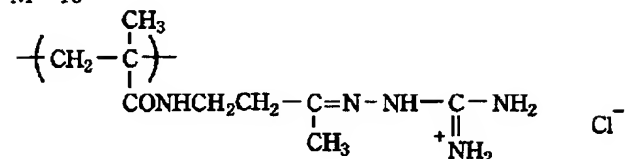
[0107]

[Formula 23]

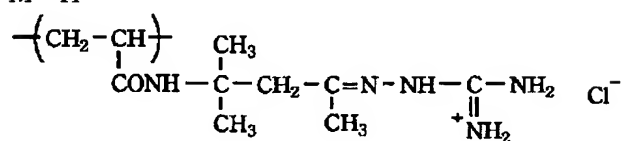
M-9



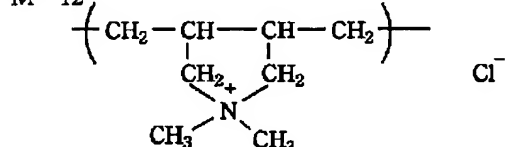
M-10



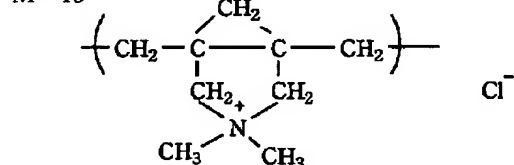
M-11



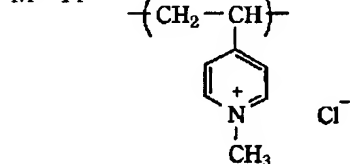
M-12



M-13



M-14



[0108] In a general formula (L), a divinylbenzene, ethylene glycol dimethacrylate, trimethylolpropane triacrylate, tetramethylene-glycol diacrylate, propylene-glycol dimethacrylate, etc. are mentioned as an example of the monomer which forms the repeat unit expressed with B, for example. In a general formula (L), ethylene, 1-butene, styrene, an acrylic acid, a methacrylic acid, methyl methacrylate, ethyl methacrylate, n-butyl acrylate, t-butyl acrylate, n-octyl acrylate, benzyl acrylate, acrylic nitril, a MARENI acid, vinyl acetate, an acrylamide, hydronalium texture chill methacrylate, etc. are mentioned as an example of the monomer which forms the repeat unit expressed with C, for example.

[0109] the image recording medium of the [image recording method] this invention -- an ink fixed-bed side -- an image -- water color ink is made to adhere like and a picture can be recorded by permeating and fixing water color ink in the ink fixed bed by this Specifically, it can use for the image recording method which consists of the discharge and acceptance of coloring matter like an ink-jet method, a sublimated type hot printing method, and a coloring matter diffusion transfer method. If the image recording medium of this invention is used, an effect is remarkable in an ink-jet method. There are continuous system and an on-demand formula in an ink-jet method. The head of an ink jet is classified into the method which uses a piezo method, Bubble Jet, a thermal jet method, and an ultrasonic wave. By the image recording method of the latest ink-jet method, the method which injects much ink with thin concentration called photograph ink by small volume, the method which improves quality of image using two or more ink in which concentration differs by the same hue substantially, and the method using transparent and colorless ink are proposed. the image recording method \*\*\*\* using an ink jet printer with a print speed quick [ the record medium of this invention ] -- it is used good Moreover, the record medium of this invention is preferably used also in the image recording method using the ink jet printer (injection quantity : two

or more 10 ml/m of ink) which injects ink with low concentration so much. in order that [ moreover, ] the latest color ink jet printer may improve quality of image -- the yellow from three colors of yellow, a Magenta, and cyanogen, a Magenta, cyanogen, and black -- the kind of ink is made to increase by gradually further by four colors with six colors of yellow, a deep Magenta, a thin Magenta, deep cyanogen, thin cyanogen, and black this invention record medium can acquire a better picture in the method of recording a color picture using many kinds (especially six or more colors) of ink. Furthermore, the latest color ink jet printer makes the size of an ink drop adjustable in order to improve quality of image. this invention record medium can acquire a better picture in the way a size records a color picture using an adjustable ink drop.

[0110]

[Example] Although this invention is explained below based on an example, this invention is not limited to this example. In addition, as long as there is no notice especially, "they are " and "% comparatively" etc. is mass criteria.

[0111] an example -- the mixing ratio used the paper of fine quality (density : 1.05, thickness : 152 micrometers) of LBKP/NBSP=6/4 as a base material 1 (base material) pulp

(Formation of a polyolefine layer) Polyethylene was laminated to both sides of a base material at 300 degrees C by the extrusion coating method, the polyolefine layer was formed in them, and the following base material (1) was obtained.

Base material (1) . 215.2 micrometers of sum total thickness (\*\*) -- a surface under coat (gelatin) Thickness 0.1 micrometers (b) surface polyolefine layer Thickness 36.9 micrometers Low density polyethylene (density 0.923) : The 90.2 sections The titanium oxide which carried out scaling : The 9.8 sections Ultramarine blue : The 0.001 sections (c) pulp layer 152.0 micrometers of thickness Paper of fine quality (LBKP/NBSP=6/4, density 1.053) The polyolefine layer on the rear face of a (d) Thickness 27.0 micrometers High density polyethylene (density 0.955) (e) rear-face under coat thickness 0.1 micrometers Styrene / acrylate copolymer Colloidal silica Polystyrene sulfonate soda. [0112] (Formation of the ink fixed bed and a surface-protection layer) On the above-mentioned base material (1), the simultaneous application of the layer which consists of composition and lamination of Table 6 was carried out, and the television papers 101-110 were created. In addition, the ink fixed bed (1) is a layer by the side of a base material most. In addition, there is no ink fixed bed (2) in the television papers 101,102 and 103.

[0113]

[Table 6]

受像紙	インク固定層(1)		インク固定層(2)		写真性	接着	画像再転写	計
	ポリマー	添加量	ポリマー	添加量				
101 (比較例)	PVA	11.2	—	—	1	3	1	5
102 (比較例)	PEO	11.2	—	—	2	1	4	7
103 (比較例)	PVA	5.6	—	—	1	2	2	5
	PEO	5.6						
104 (本発明)	PVA	9.7	PEO	1.5	3	3	5	11
105 (本発明)	PEO	9.7	PVA	1.5	5	4	4	13
106 (本発明)	PVA	3.2	PEO	0.5	2	3	4	9
	Gel-1	6.5						
107 (本発明)	PVA	9.7	PEO	0.5	3	3	4	10
108 (本発明)	PEO	9.7	PVA	0.5	4	4	3	11
109 (本発明)	例示化合物 B-2	9.7	PVA	1.5	4	5	5	14
110 (本発明)	下記化合物 P-1	9.7	PVA	1.5	5	5	5	15

PVA: ポリビニールアルコール(平均重合度 500、酸化度 88%)、PEO: ポリエチレンオキシド (平均分子量約 15 万)

Gel-1: フェニルカルバモイル化ゼラチン(アミノ基封鎖率 85%)、Gel-2: 石灰処理ゼラチン

P-1: ポリエチレンオキシド(平均分子量約 5 万)および例示化合物 S-03 と水添ジフェニルメタン -4,4'-ジイソシアネートとの反応生成物

[0114] Each television paper was cut out in 295cm long and 21.0cm wide A4 sheet size. The photograph was printed on each sample using the ink-jet color printer (PM750C, made in SEIKO EPSON, black ink MJIC7, and color ink PMIC1C use). A photograph is a camera (EOS-10, product made from Canon), and read and digital-



signal-ized with the scanner the photograph taken to the color reversal film (pro beer 100, Fuji Photo Film Co., Ltd. make). Moreover, the picture photoed in part with the digital still camera (FinePix700, Fuji Photo Film Co., Ltd. make) was also used. 20 kinds, such as scenery carried based on the photographic subject distribution of a general photograph user, nature, a person, clothing, and a still life, were used for the pattern.

[0115] Seeing whether a front face is ground against the fixed time said width of face for the printed sample from immediately after an output, and an ink picture can be ground estimated ink absorptivity. This evaluation was carried out under 25 degree-C-50%RH and the 30 degree-C-80%RH environment. The result was shown by considering the result synthesized to Table 6 as "adhesion" in five stages of 1 (it is inferior)-5 (it excels). moreover, viewing estimated the granular nonuniformity (an ink drop -- being mixed -- the nonuniformity of the shape of a rosary to produce) of the output picture, sharpness, and hue repeatability, and the result was shown in Table 6 in five stages of 1-5 like Table 7 by making the comprehensive result into "photograph nature" Moreover, the television paper and the image reception area of each intact level were piled up for the printed sample after [ of an output ] 2 minutes, the load of 100 g/cm<sup>2</sup> was imposed, and it was left for 16 hours. The imprint situation of the picture through which it passes intact after that was evaluated in five stages to 1 (there are many picture imprints and it is bad)-5 (the imprint of a picture is not seen but it is satisfactory), and it was shown in Table 6 by considering the result as "a picture re-imprint." "Adhesion" and the "picture re-imprint" are evaluation of handling nature.

[0116] As shown in Table 6, the television paper (104-110) of this invention is excellent in the comprehensiveness ability of photograph nature and handling nature as compared with the example of comparison (101-103). The television paper (104 107) in which a surface layer (ink fixed bed (2)) consists of PEO in it is in the inclination to excel in a picture re-imprint as compared with the television paper (105 108) which consists of PVA. On the contrary, the television paper (105 108) which consists of PVA is in the inclination to excel in photograph nature and adhesion, to the television paper (104 107) which consists of PEO. It turns out that 108 is similarly inferior in a picture re-imprint being inferior compared with the case (104) where it does not use when the composition of the main polymer of each class is the same and gelatin is used for a surface layer (ink fixed bed (2)) (106 107) compared with 105. Moreover, it turns out that it \*\*\*\* when denaturation alkylene oxide polymer is used (the television paper 109 using instantiation polymer B-2, and television paper 110 using polymer P-1) and simple PEO is used (105), and adhesion and the picture re-imprint are excellent. The ink-jet image recording medium of this invention is excellent as mentioned above.

[0117] When the base material of an example 1 was changed to the base material (1) and the same examination was performed using the mirror coat platinum (174.4 g/m<sup>2</sup>) by Oji Paper Co., Ltd., the result of the same inclination was obtained. Moreover, when this base material was used, as compared with the base material (1), adhesion and the picture re-imprint suited the good inclination. Moreover, the same result was obtained even if it used the Nippon Paper Industries esprit coat C (209.3 g/m<sup>2</sup>) similarly.

[0118] The simultaneous application of the layer which consists of composition and lamination of Table 7 on it was carried out using the base material (1) of an example 1 as example 2 base material, and the television papers 201-205 were created. In addition, the ink fixed bed (1) is a layer by the side of a base material most.

[0119]

[Table 7]

受像紙	インク固定層(1)		インク固定層(2)		写真性	接着	光画像 保存性	画像再転写
	ポリマー	添加量	ポリマー	添加量				
201 (本発明)	例示化合物 B-2	11.7	PVA	1.5	4	5	2	5
202 (本発明)	前記化合物 P-1	11.7	PVA	1.5	5	5	2	5
203 (本発明)	例示化合物 B-2 媒染剤 CPM-17	9.7 2.0	PVA	1.5	4	5	4	4
204 (本発明)	前記化合物 P-1 媒染剤 CPM-1	9.7 2.0	PVA	1.5	5	5	4	5
205 (本発明)	前記化合物 P-1 媒染剤 CPM-4	9.7 2.0	PVA	1.5	5	5	4	4
206 (本発明)	前記化合物 P-1 媒染剤 CPM-17	9.7 2.0	PVA	1.5			4	4
207 (本発明)	前記化合物 P-1 化合物 a-53	9.7 2.0	PVA	1.5	5	5	4	5
208 (本発明)	前記化合物 P-1 媒染剤 CPM-17 化合物 a-53	9.7 2.0	PVA	1.5	4	5	5	4

[0120] The same evaluation as an example 1 was performed after handling as shows each television paper to an example 1. A result is shown in Table 7. Moreover, xenon fade meter estimated optical robustness for the printed sample. Conditions were performed by about 100,000 sample side illuminance Lux(es) (however, it repeated irradiation and un-irradiating every about 30 minutes) and 250 degrees-C-60%RH of temperature and humidity. The sum total irradiation time showed the result in Table 7 as "optical picture shelf life" ten days after. A numeric value is evaluated in six stages to 1 (it does not see as a picture but is inferior)-6 (degradation of a picture is not seen) in consideration of each YMC monochrome, the coloring matter survival rate of a gray, and the survival-rate balance of YMC. As shown in Table 7, when the mordant expressed with a general formula (1) is used together (203-206), it turns out that it excels in optical picture shelf life compared with the case (201 202) where it does not use together. Moreover, when the compound expressed with a general formula (3) is used together (207), it turns out that it excels in optical picture shelf life as compared with the case (202) where it does not use together. Furthermore, when the compound expressed with the ink fixed bed (1) by the mordant and general formula (3) which are expressed with a general formula (1) is used together and blended (208), it turns out that optical picture shelf life is most excellent. As mentioned above, a result with desirable using together and blending with the ink fixed bed containing alkylene oxide polymer the compound expressed with the mordant and general formula (3) which are expressed with a general formula (1) is obtained.

[0121]

[Effect of the Invention] Since the ink-jet image recording medium of this invention consists of a layer which makes a principal component a kind of alkylene oxide polymer at least on a base material, and a layer which makes different polyvinyl alcohol from this a principal component, it has the same handling nature as photograph quality of image (resolution, graininess, a hue, glossiness, etc.) and a silver salt photograph, and, moreover, has the same picture robustness as a silver salt photograph.

[Translation done.]